US007717145B2

(12) **United States Patent**
McDaniel

(10) **Patent No.: US 7,717,145 B2**
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(54) **ROUTER SUPPORT FOR A JIG APPARATUS**

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(73) Assignee: **Black & Decker Inc.**, Newark, DE (US)

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(21) Appl. No.: **12/268,120**

(22) Filed: **Nov. 10, 2008**

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Related U.S. Application Data

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(51) **Int. Cl.**
B27C 5/00 (2006.01)

(52) **U.S. Cl.** **144/144.1**; 144/144.51; 144/145.1

(58) **Field of Classification Search** 144/144.1, 144/144.51, 145.1, 252.1; 409/125, 130, 409/137; 408/67; 83/100
See application file for complete search history.

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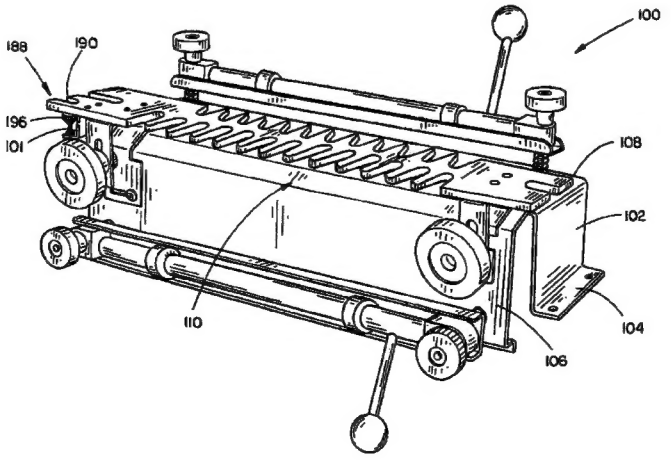
Primary Examiner—Shelley Self

(57) **ABSTRACT**

A jig apparatus for aiding in the formation of a variety of mechanically interconnecting structures in workpieces. The jig apparatus may include a base and a template mounting system for adjustably positioning a template with respect to the base. A securing system for securing a workpiece in a desired position may be included. An adjustable workpiece mounting fence may also be included for varying the angular orientation of a workpiece to be shaped with respect to a template. Additionally, a collar guide system for a router for utilization with a template may be implemented with a hand held router being implemented for removing material from a workpiece. A router bit positioning system for aiding in establishing a pre-determined bit depth may be included.

21 Claims, 25 Drawing Sheets



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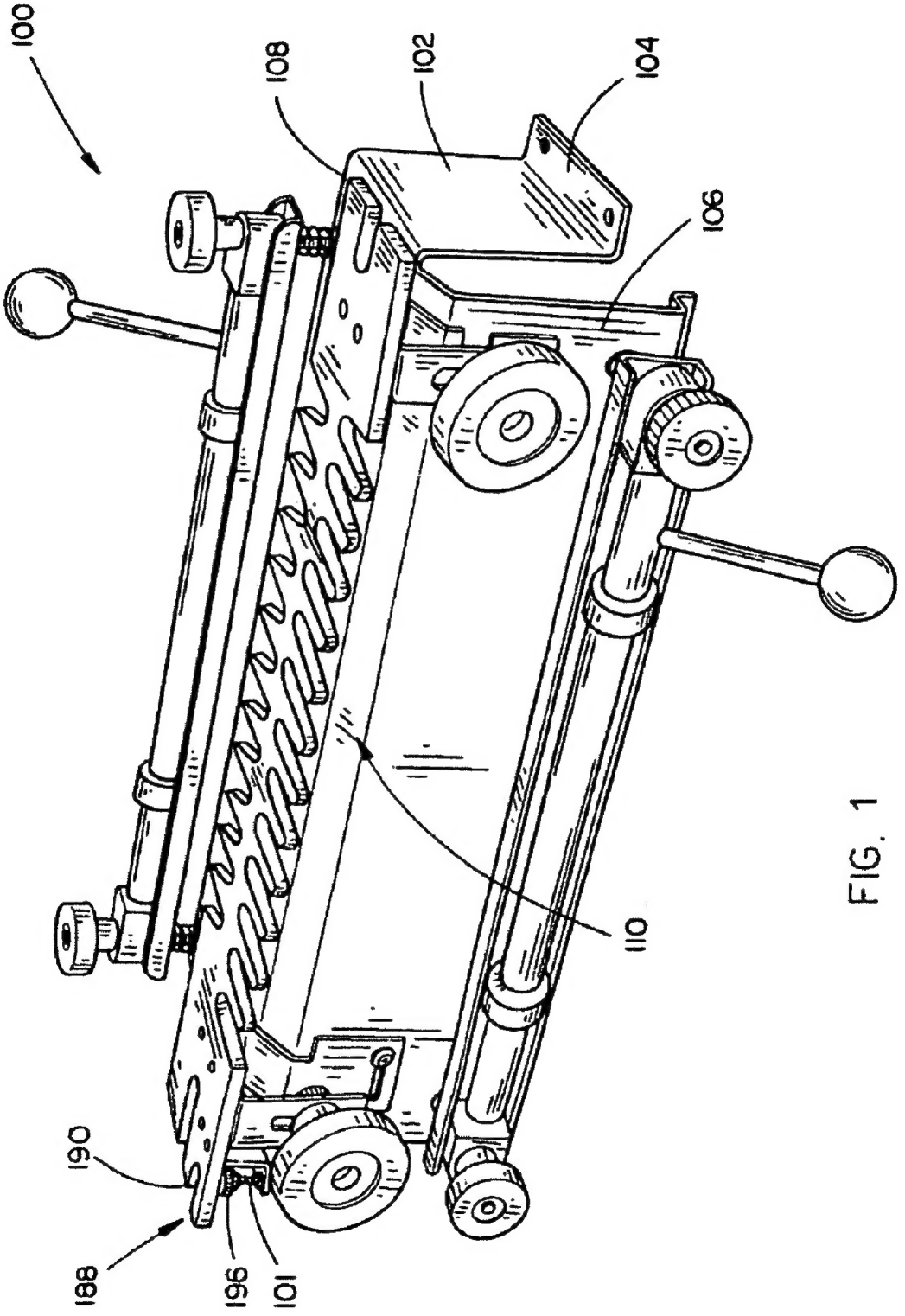


FIG. 1

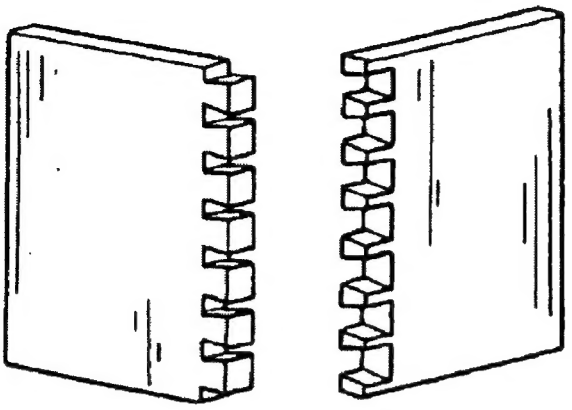
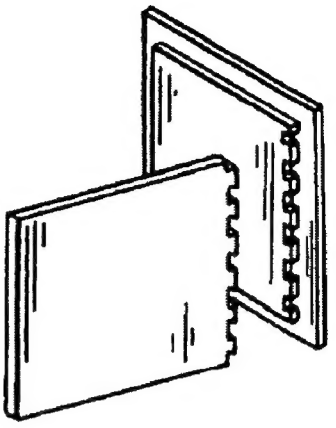


FIG. 2



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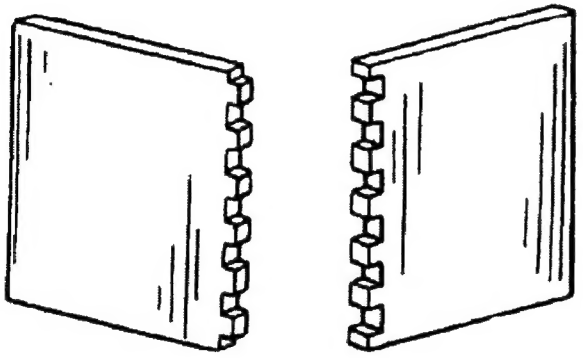

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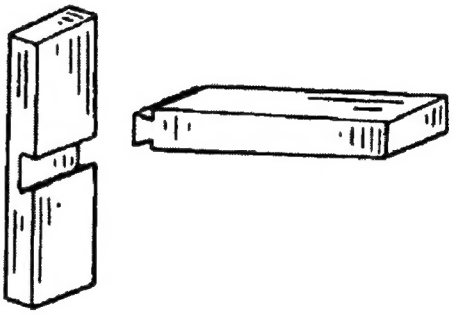

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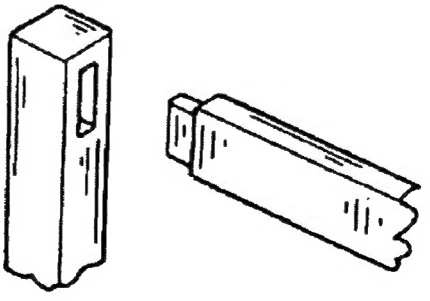

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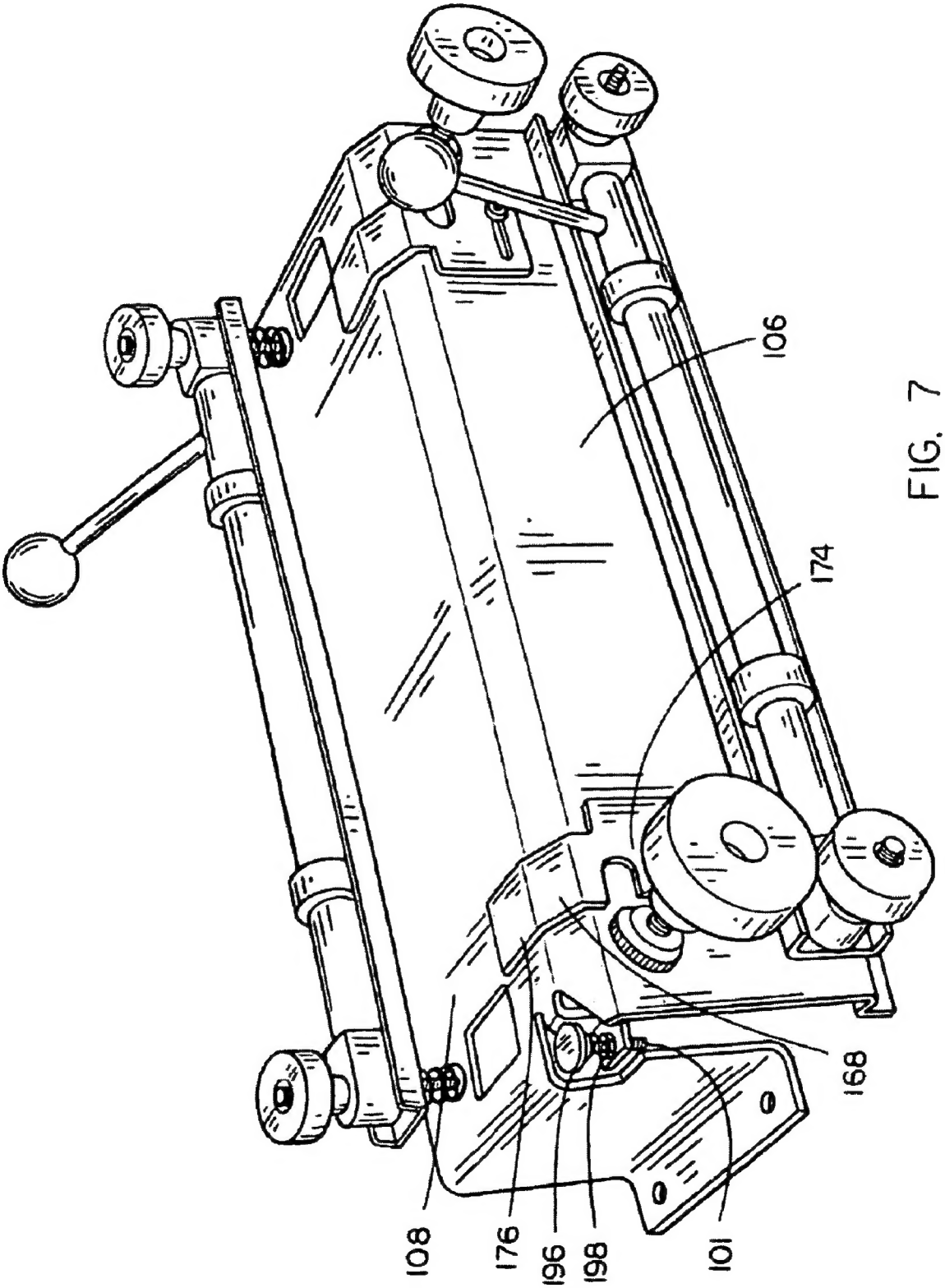

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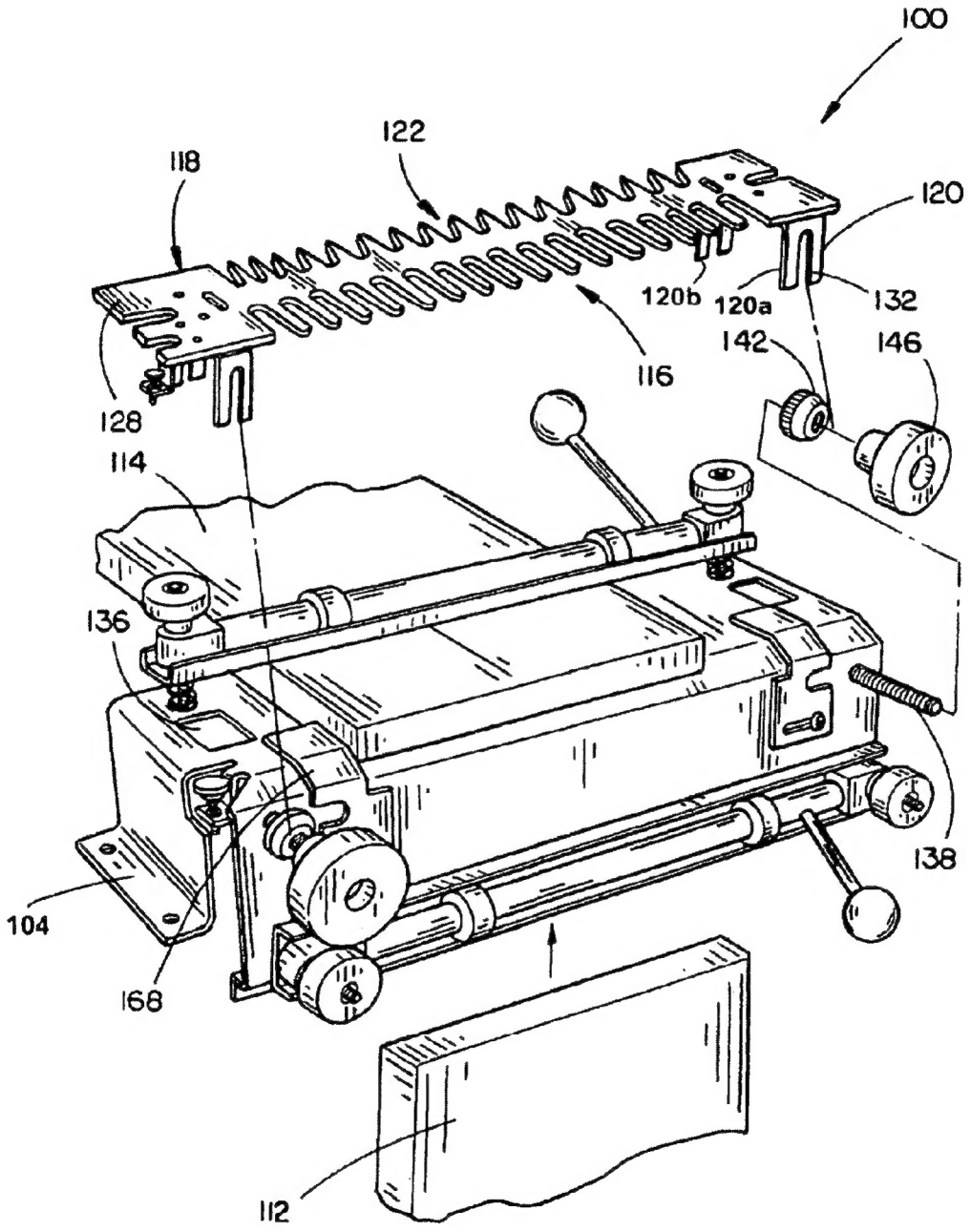
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FIG. 8A

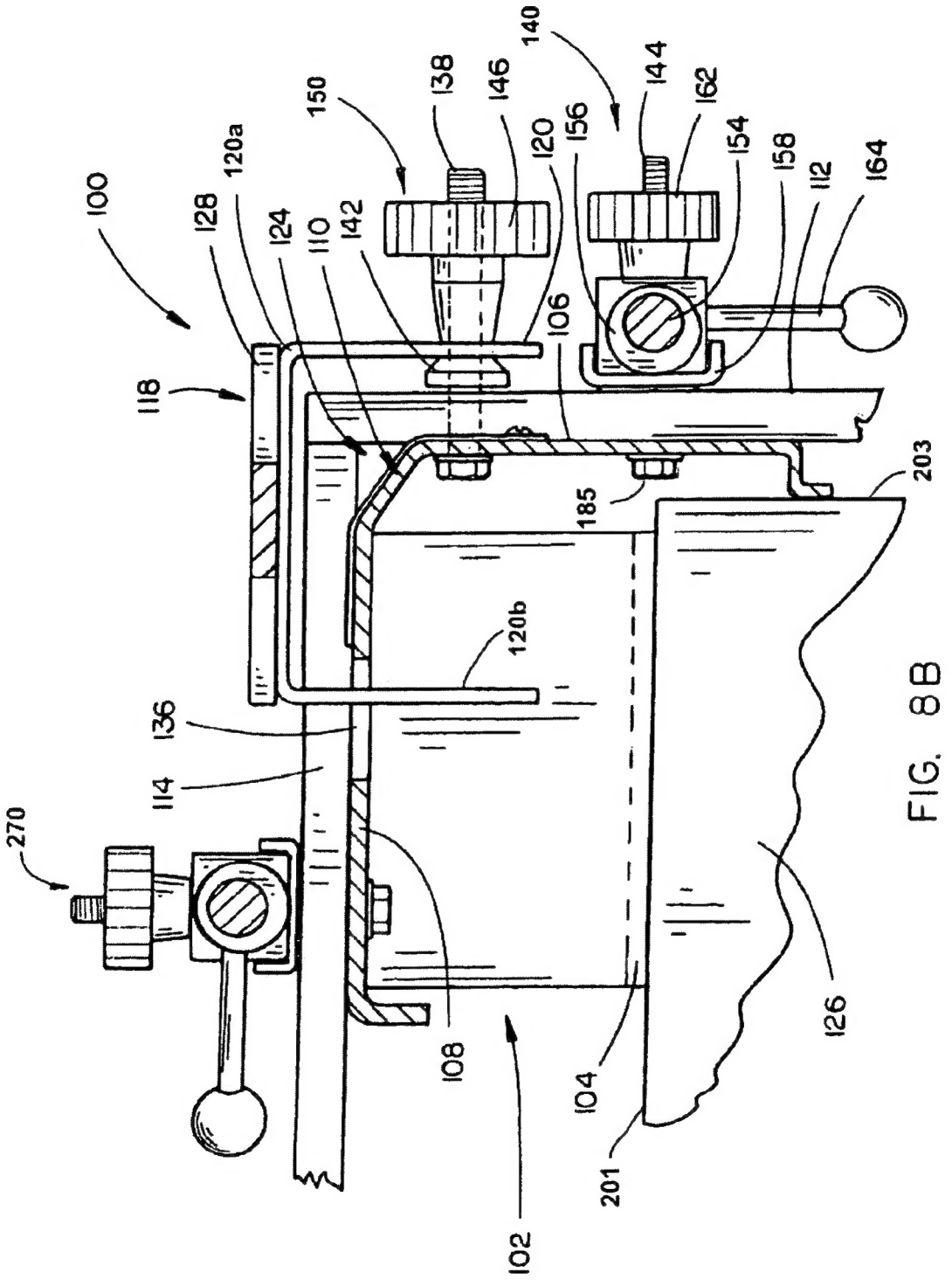
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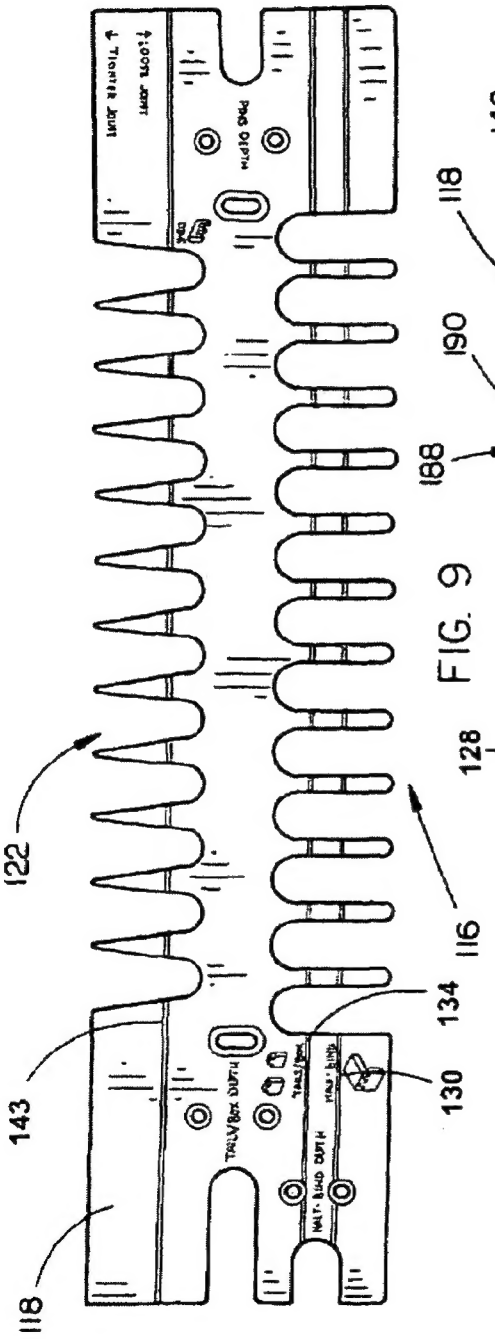
FIG. 8B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118
116
134
130

FIG. 9

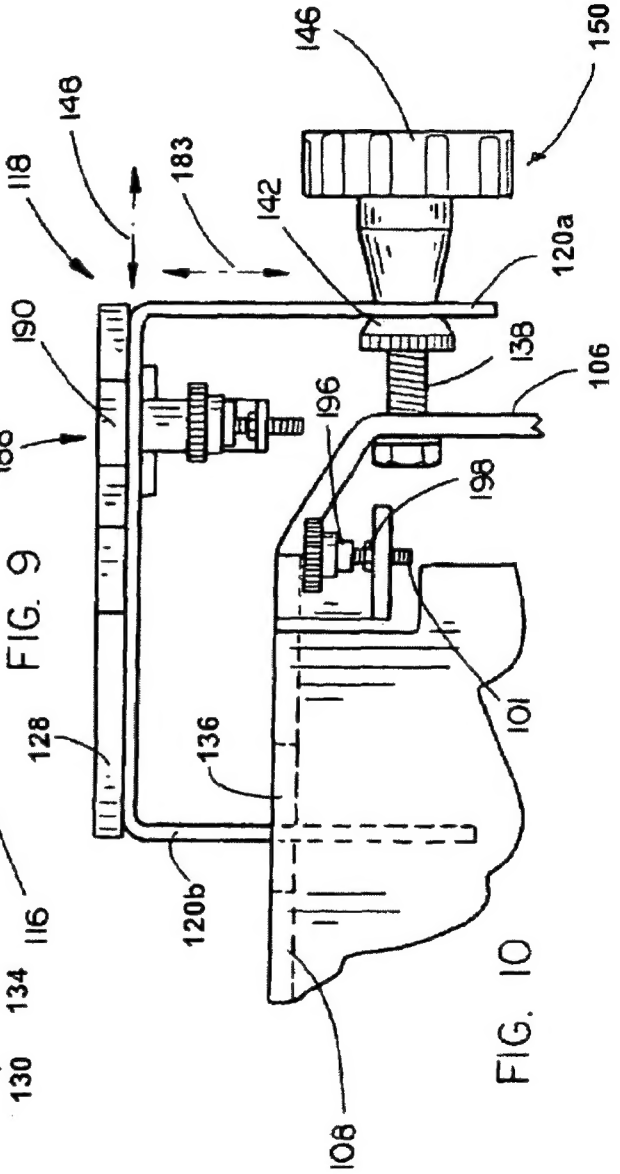

146
150
148
118
183
142
120a
190
138
106
188
196
198
101
128
136
120b
108

FIG. 10

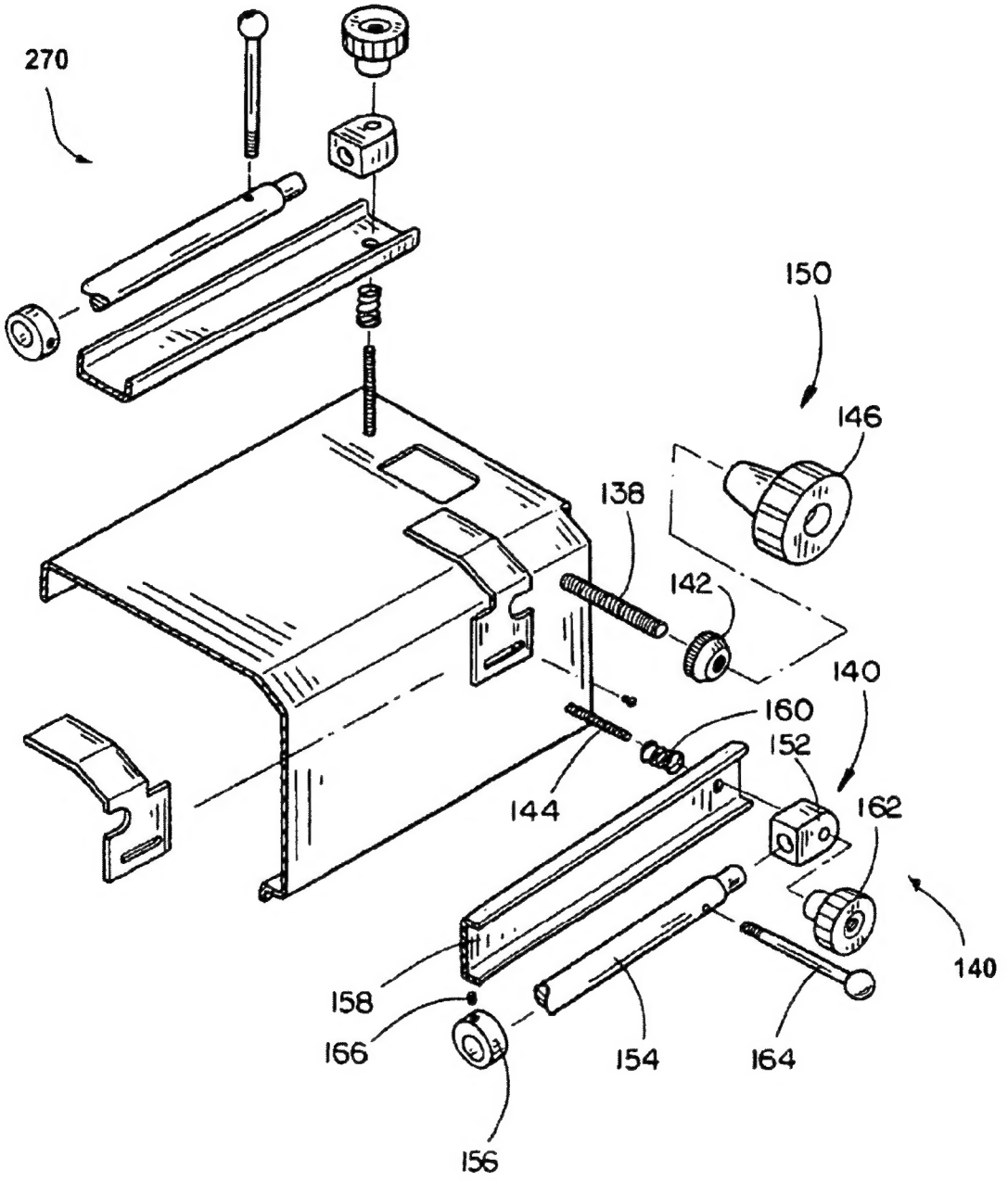


FIG. 11

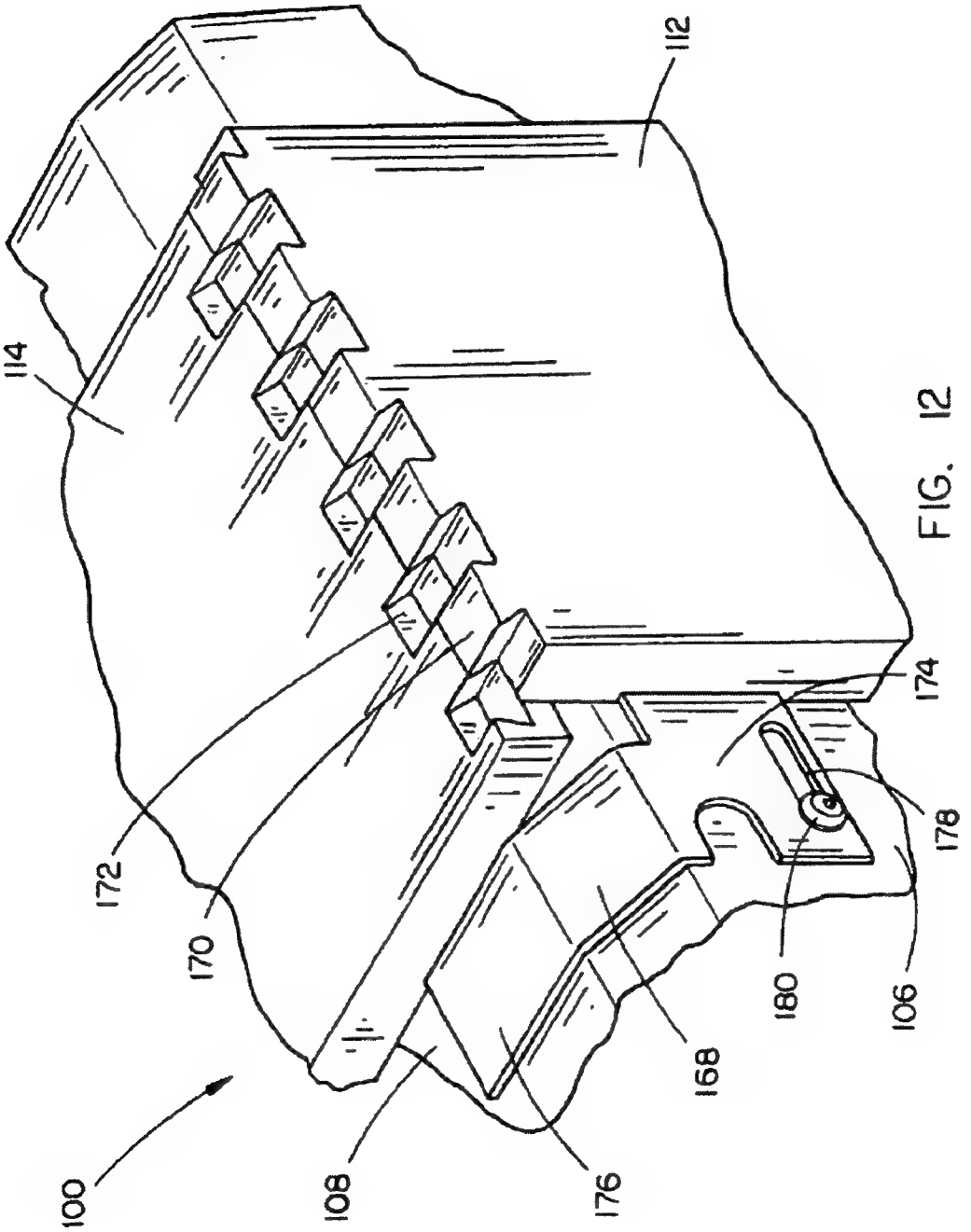


FIG. 12

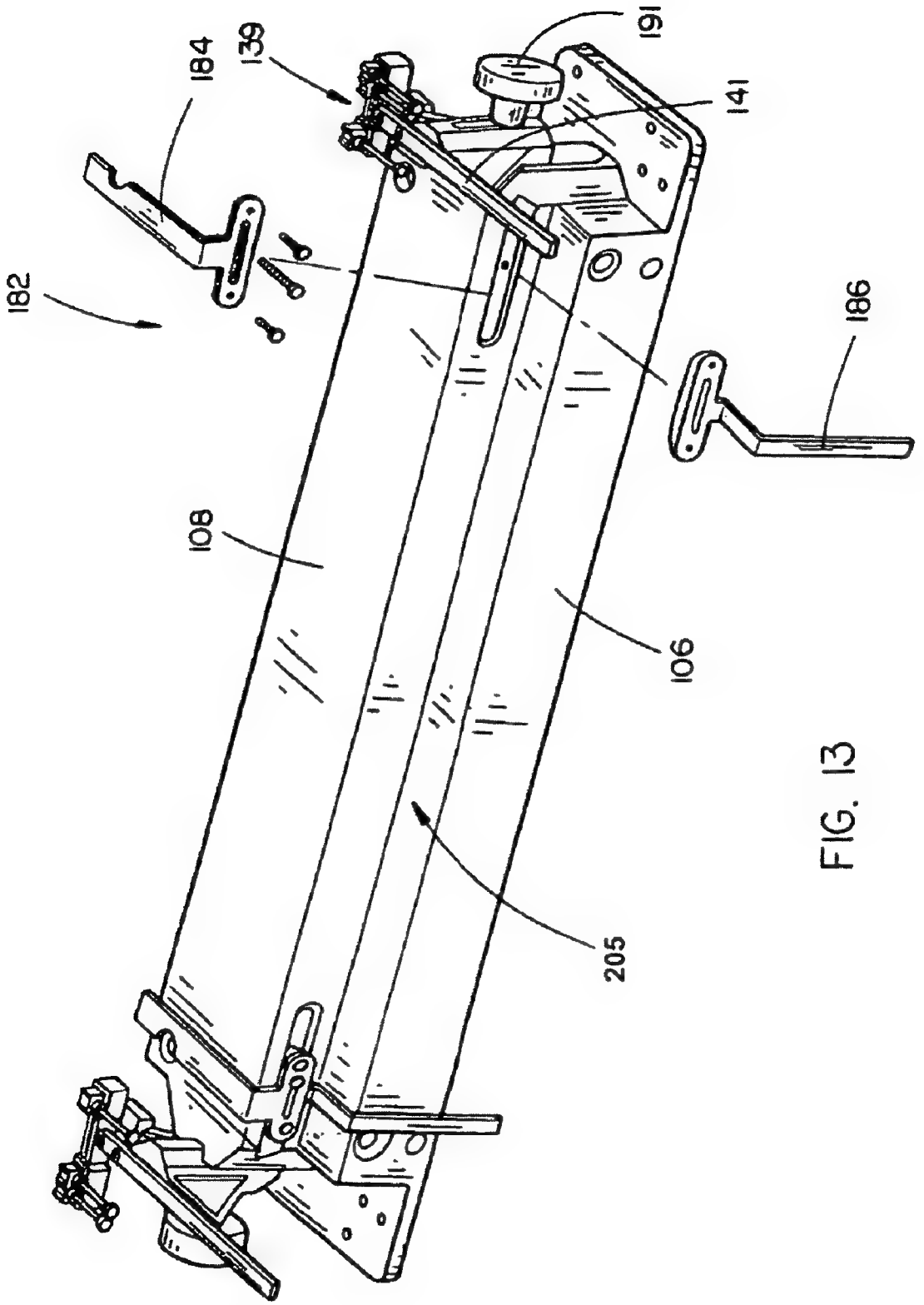


FIG. 13

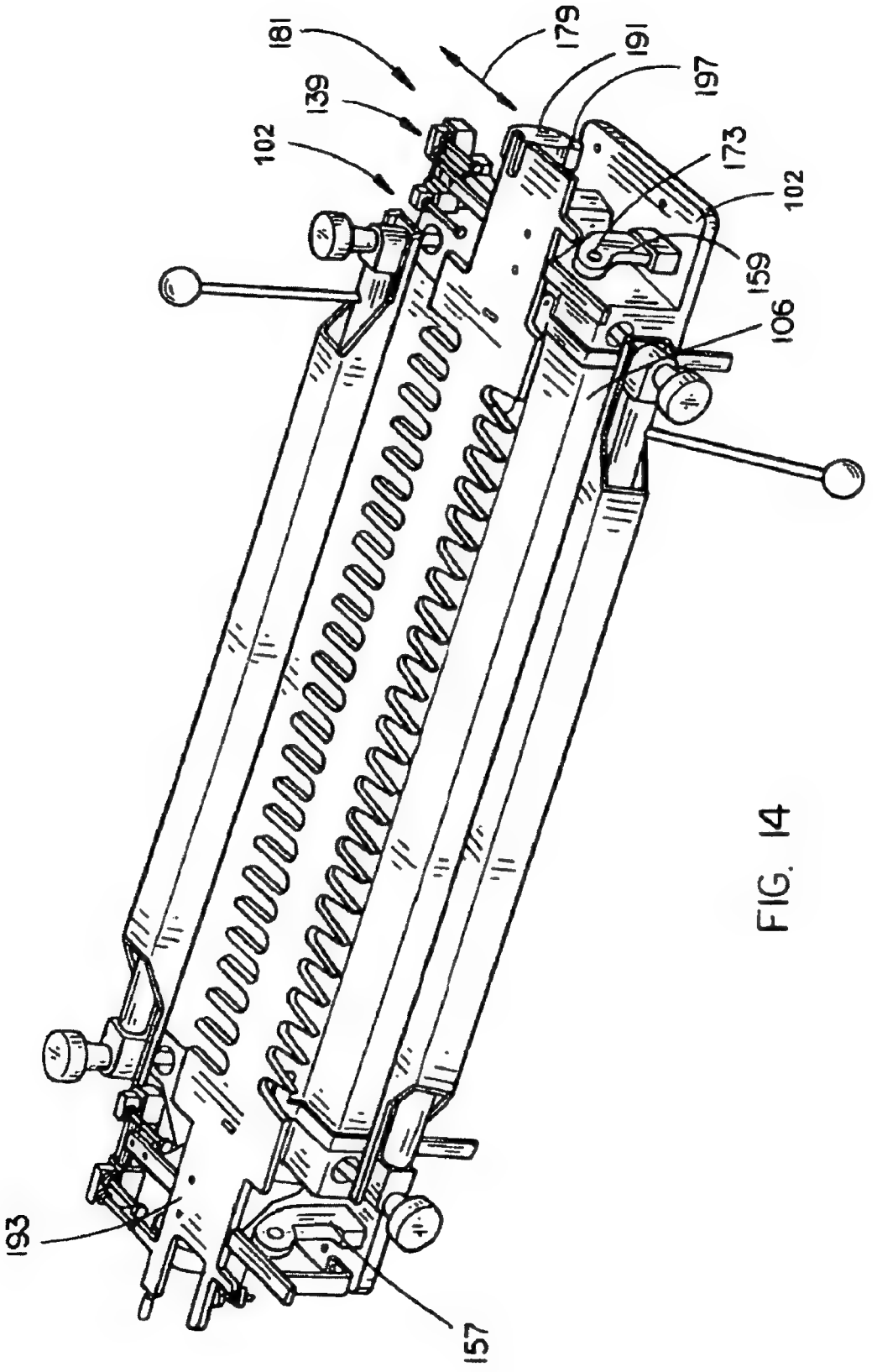


FIG. 14

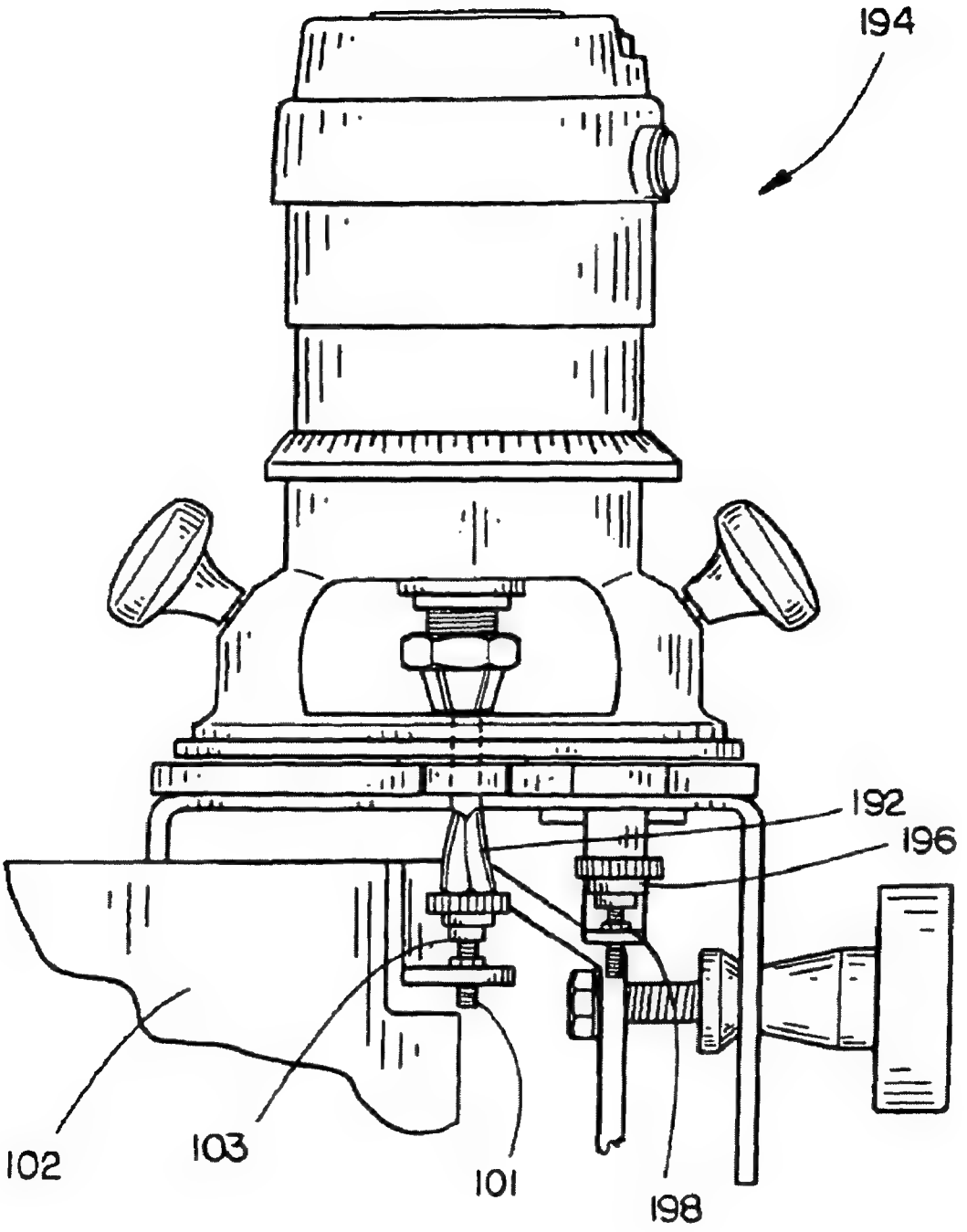


FIG. 15

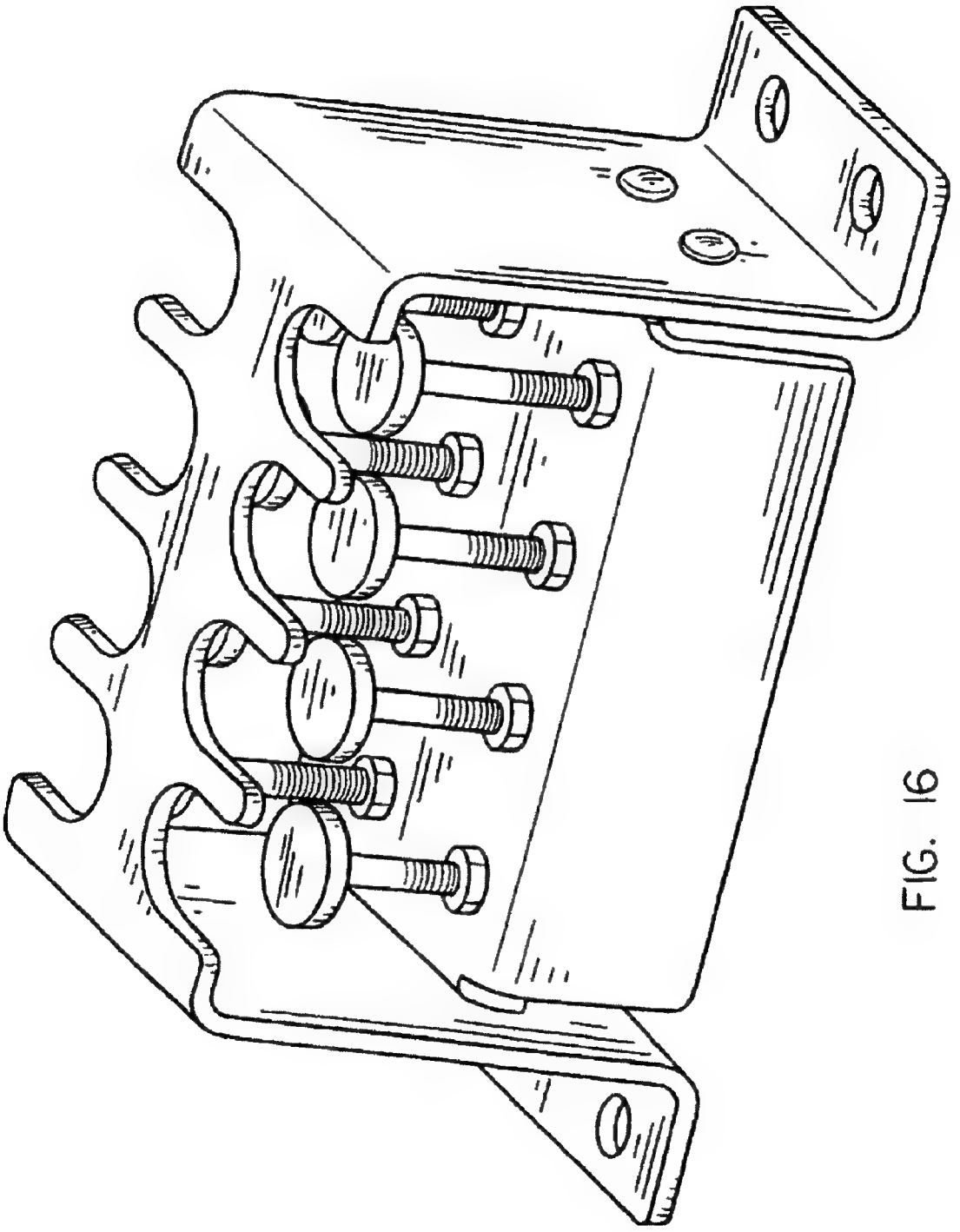


FIG. 16

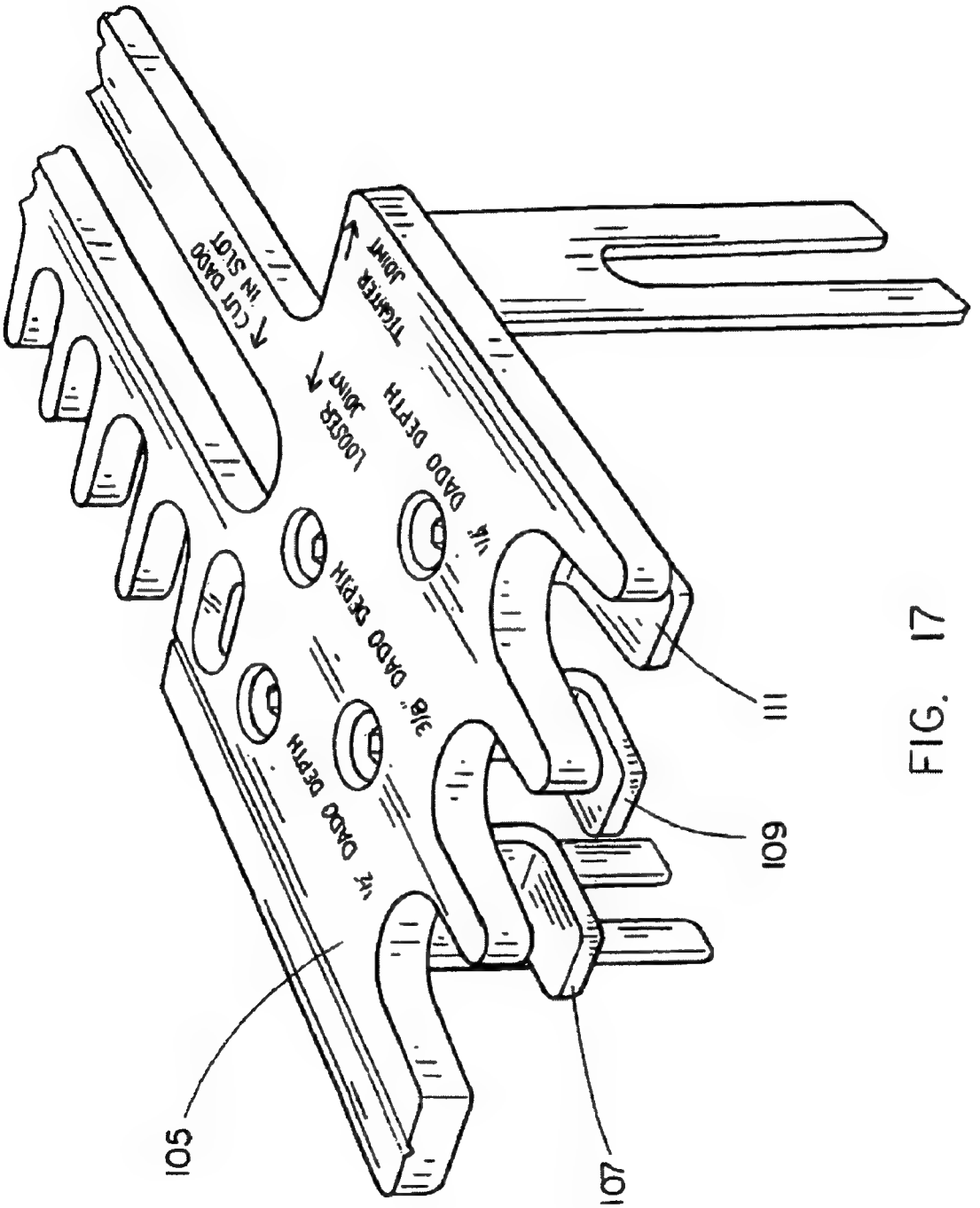

CUT DADO IN SLOT
TENON JOINT
LOOSE JOINT
1/4" DADO DEPTH
3/8" DADO DEPTH
1/2" DADO DEPTH
111
109
105
107

FIG. 17

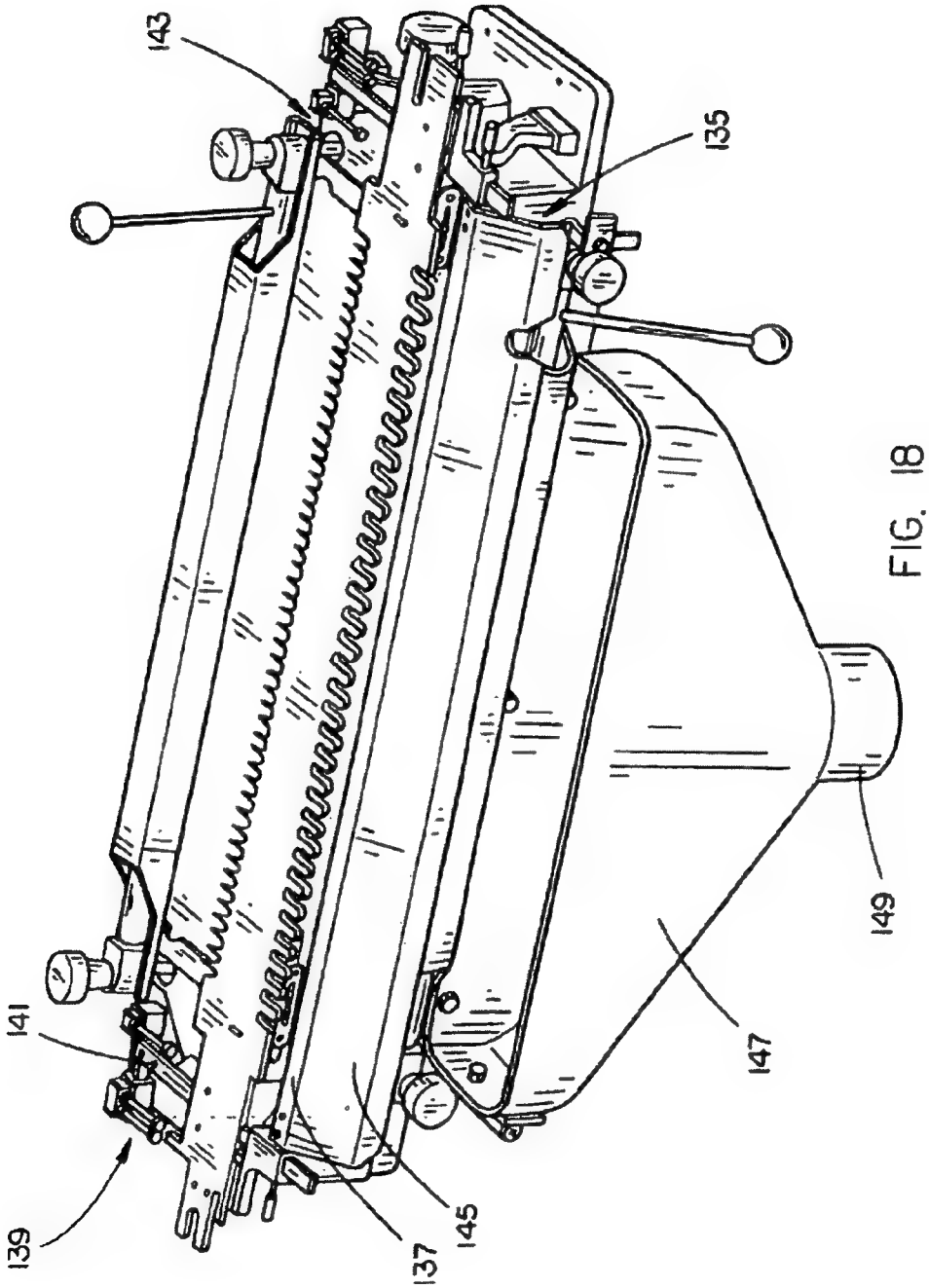


FIG. 18

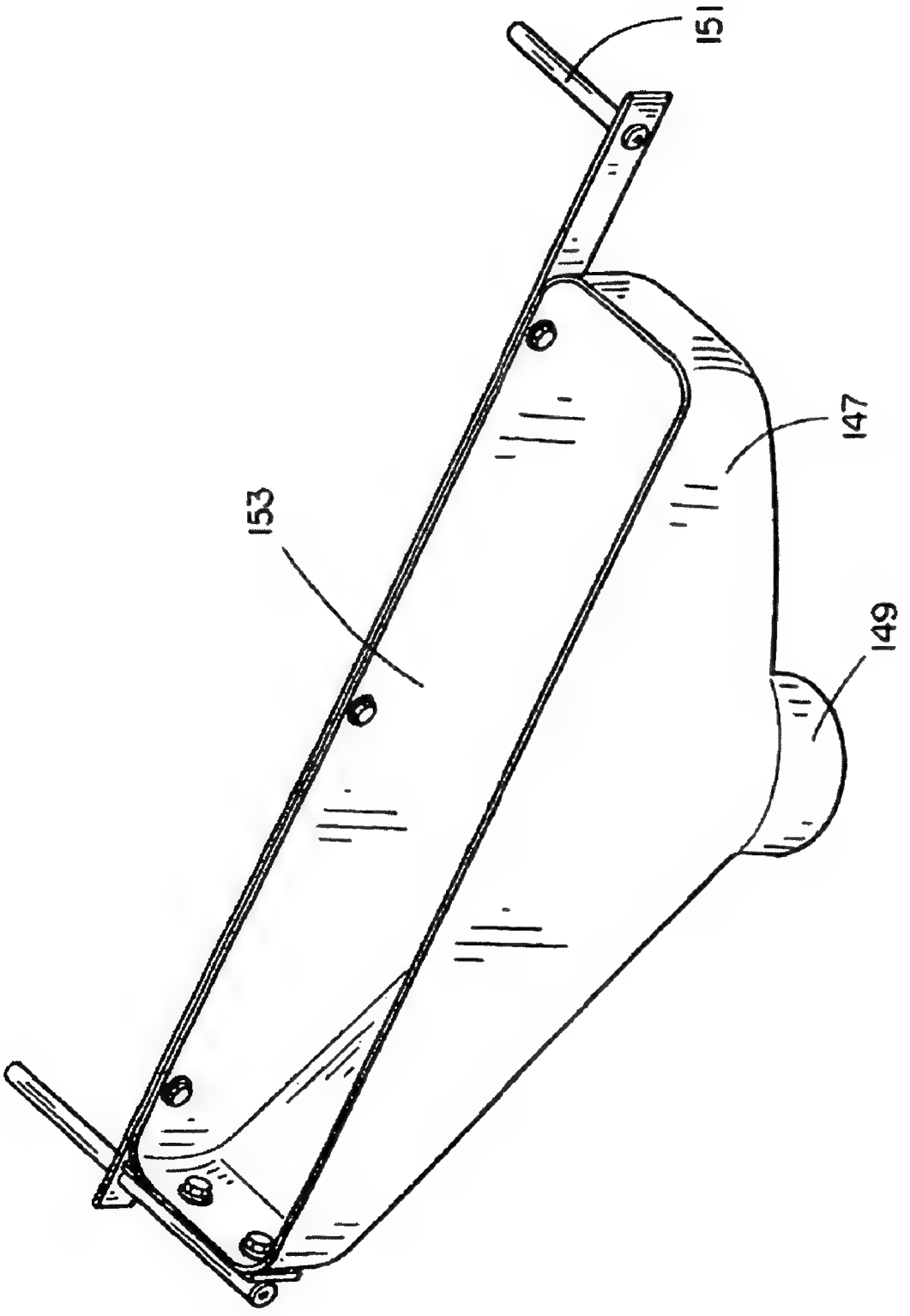


FIG. 19

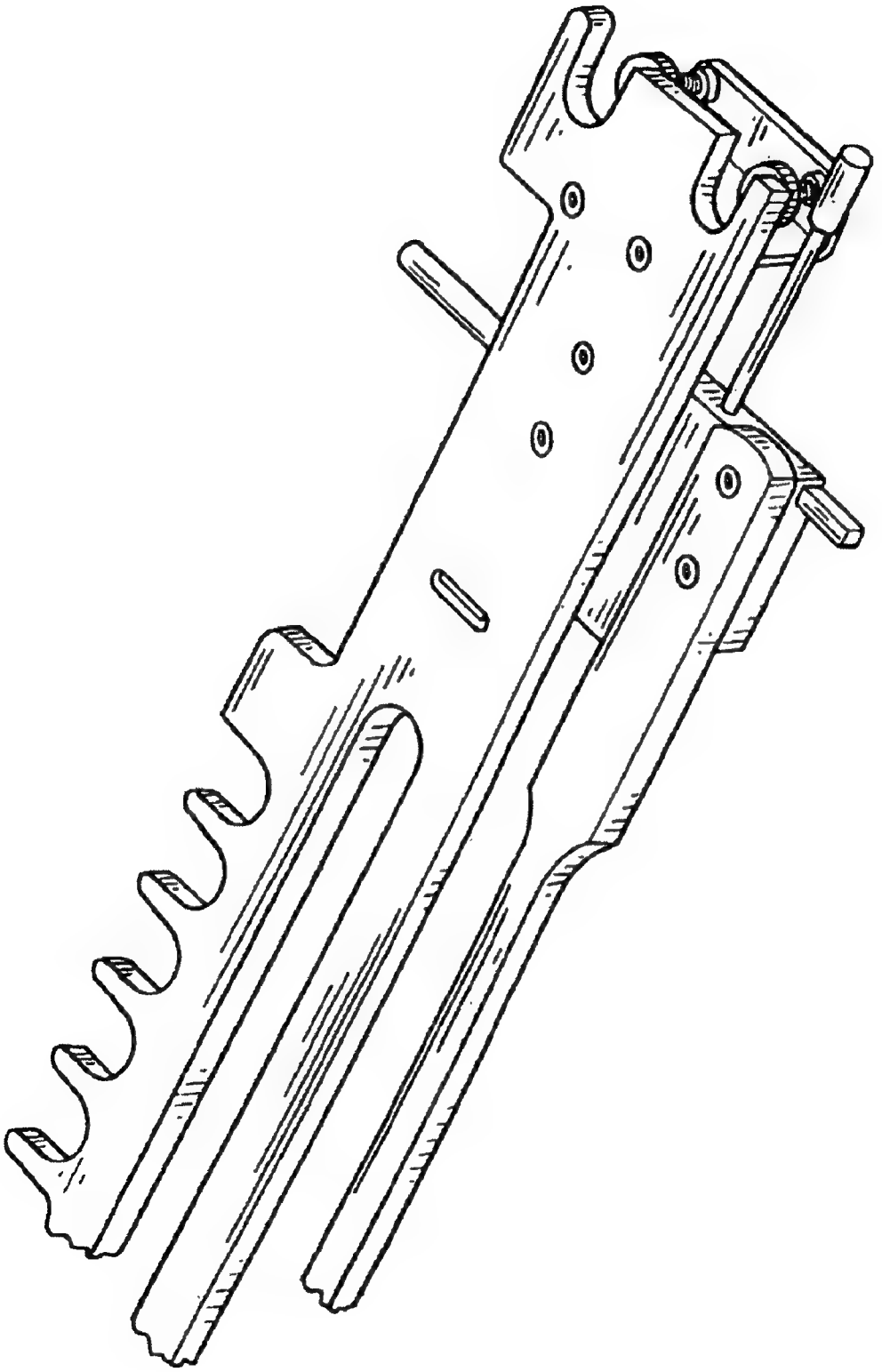


FIG. 20

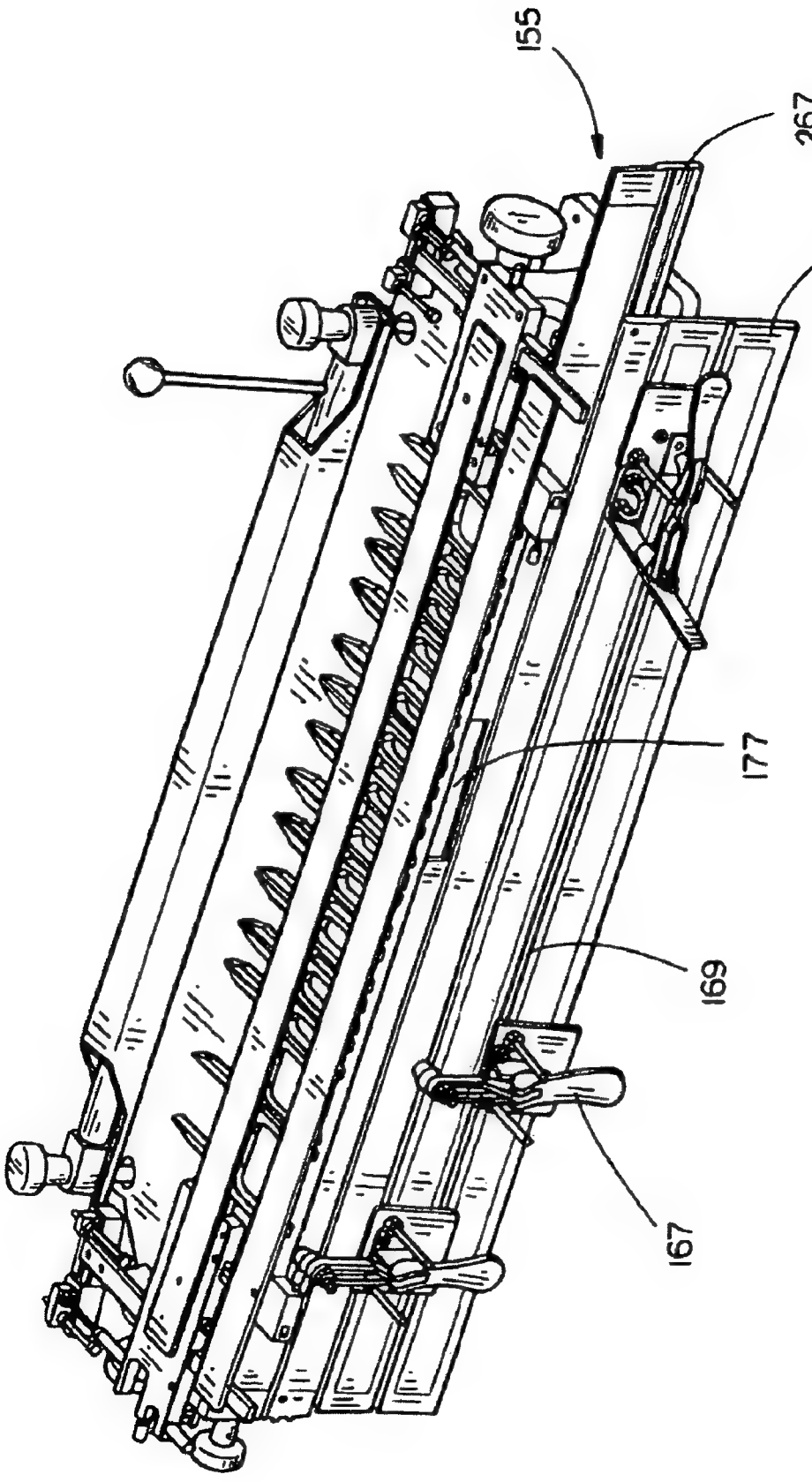


FIG. 21

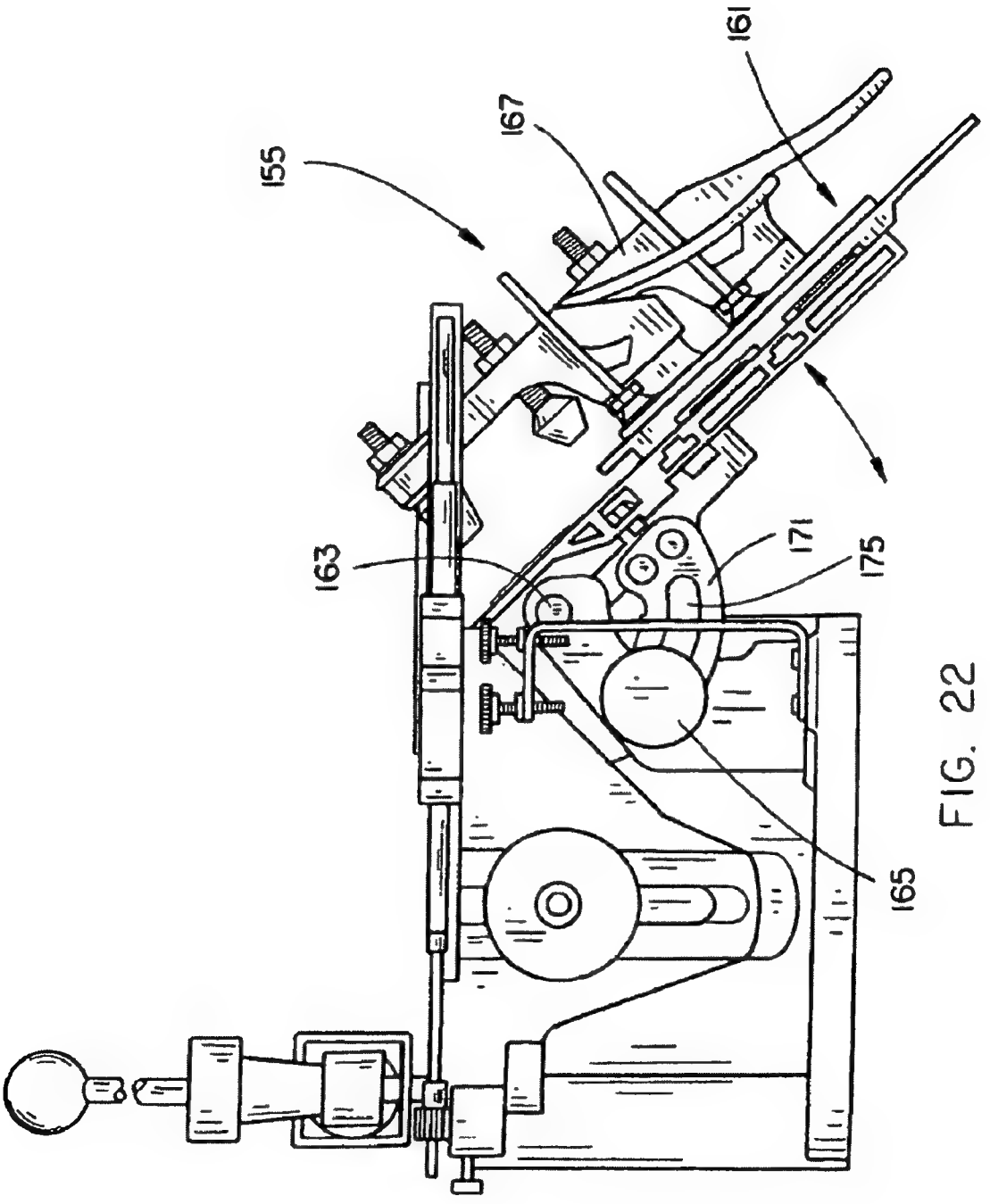


FIG. 22

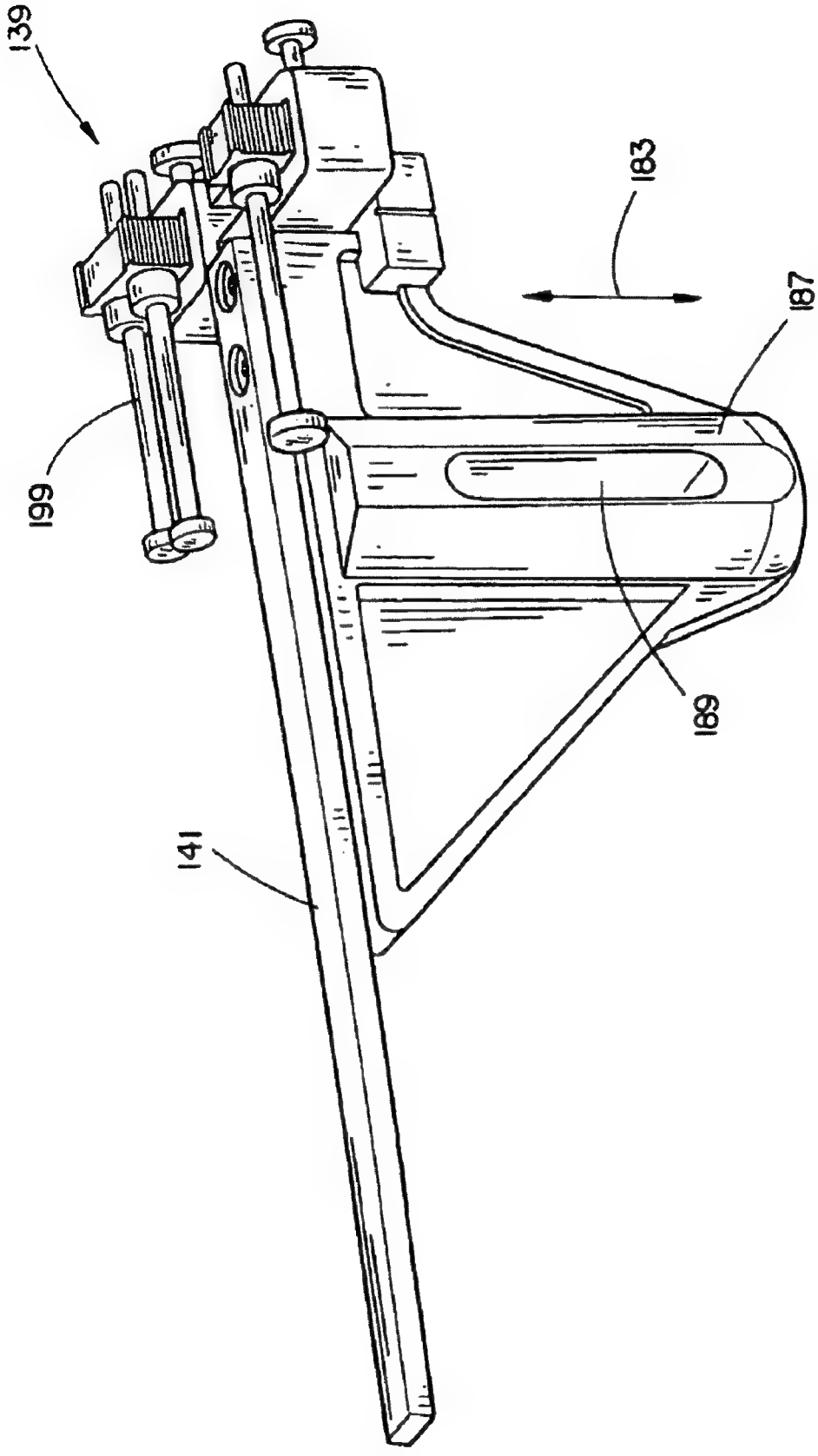


FIG. 23

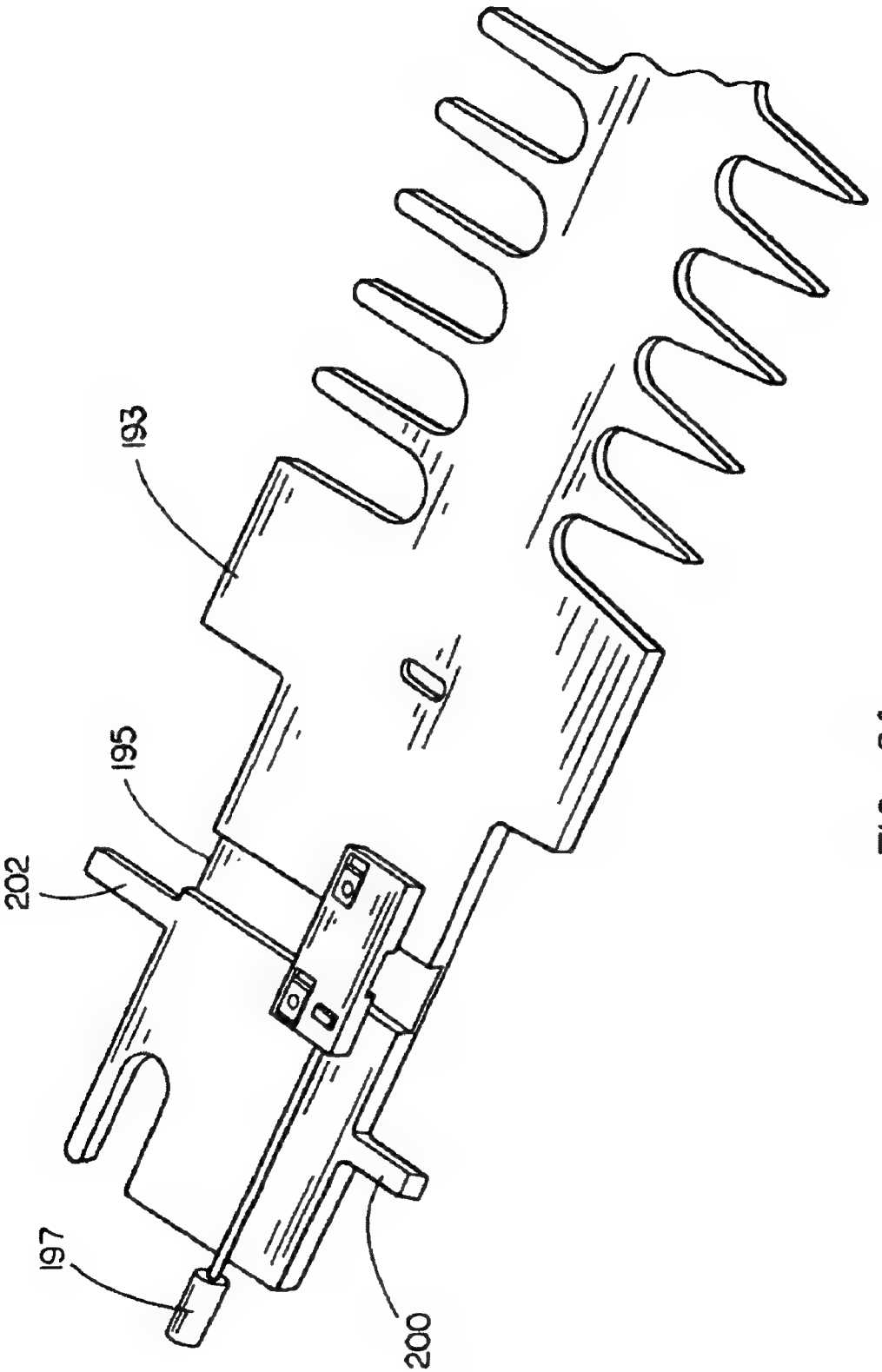


FIG. 24

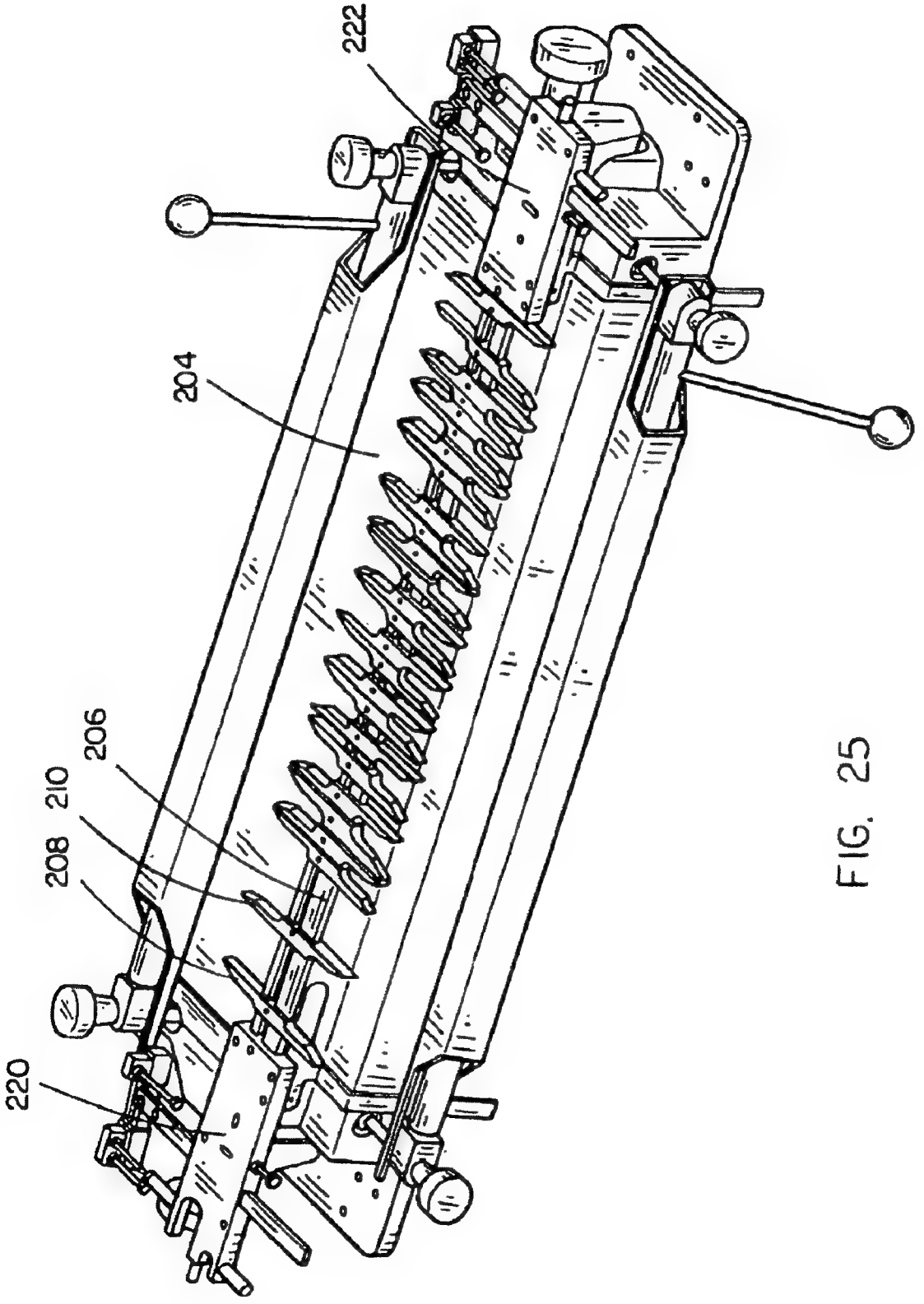


FIG. 25

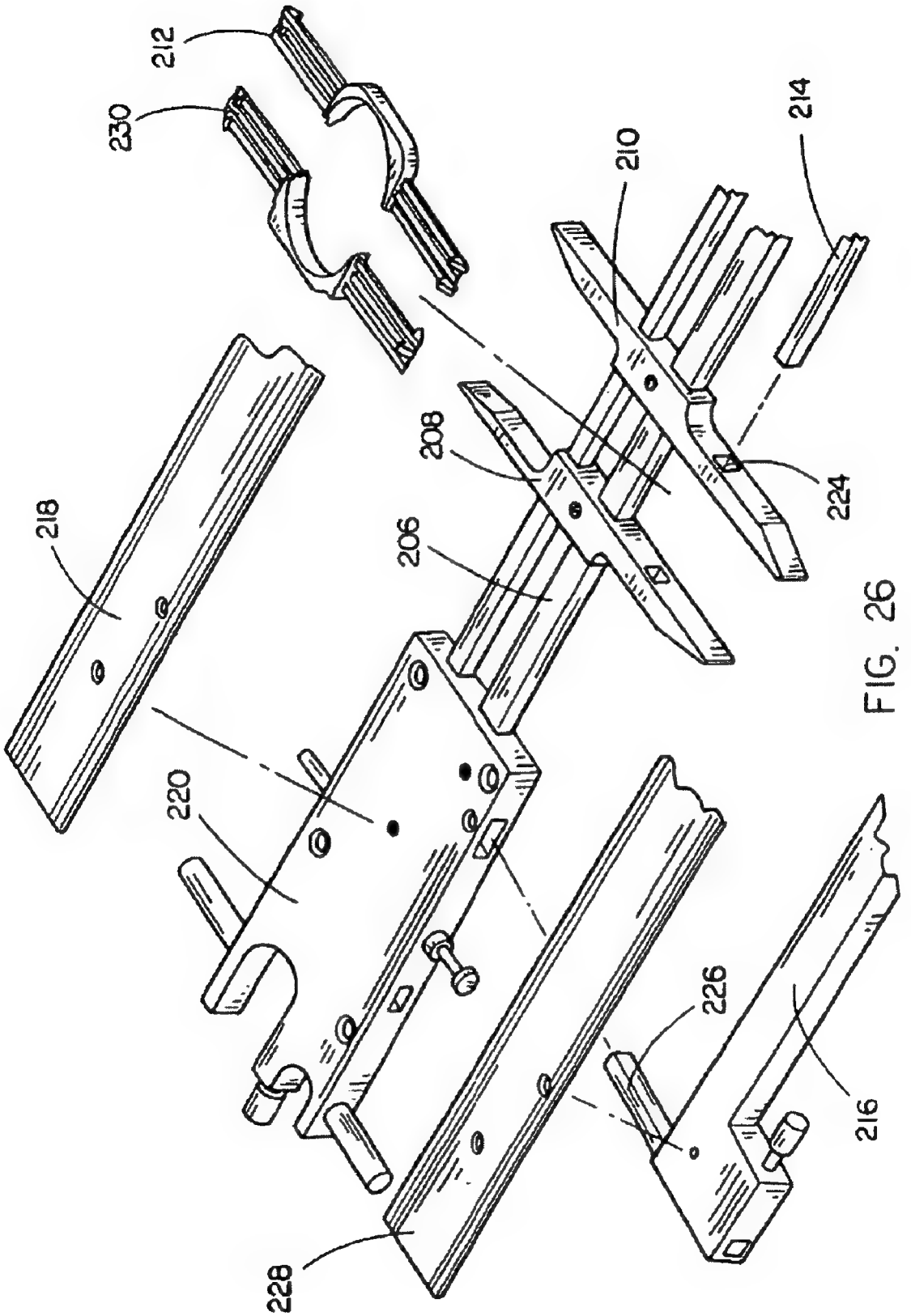


FIG. 26

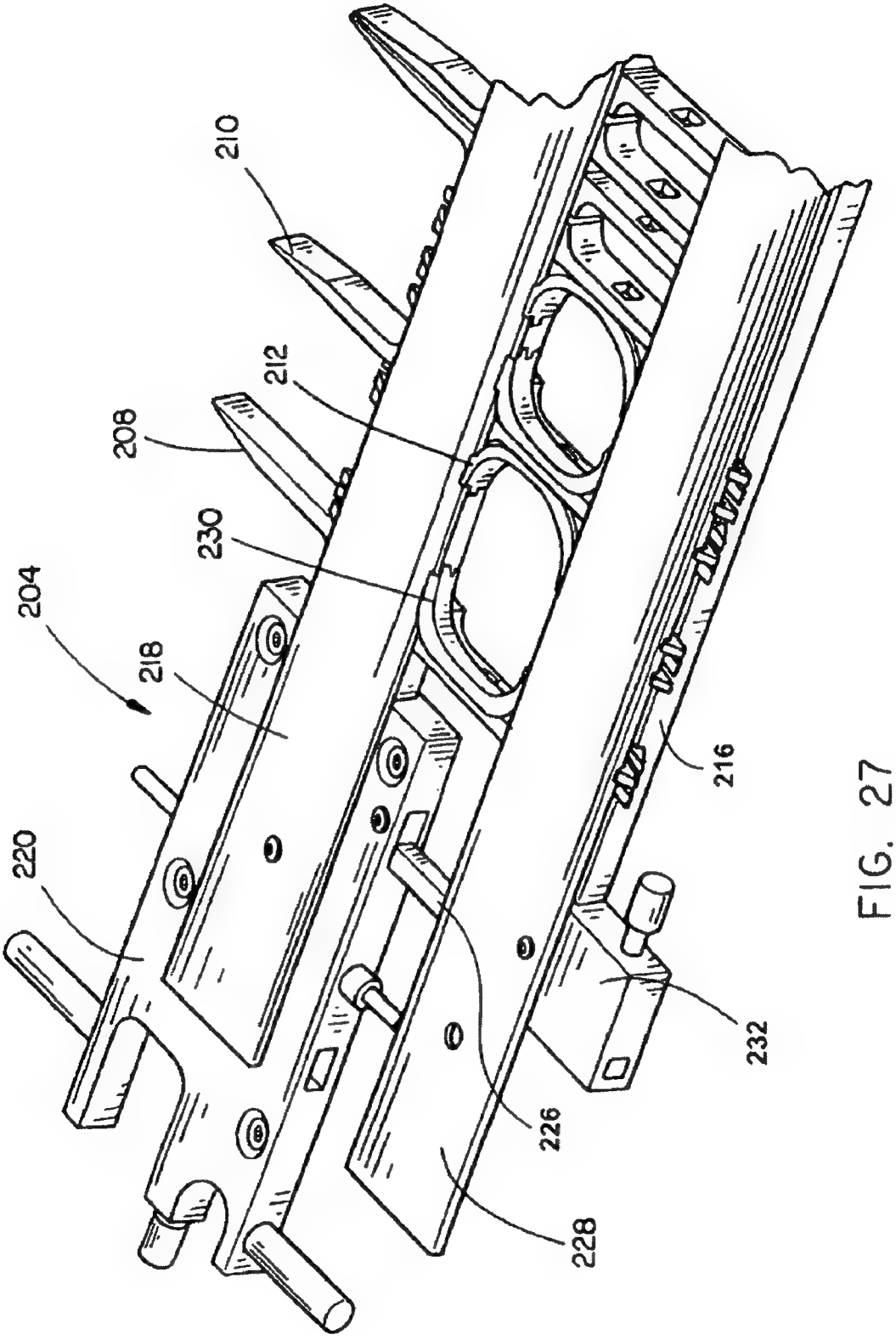


FIG. 27

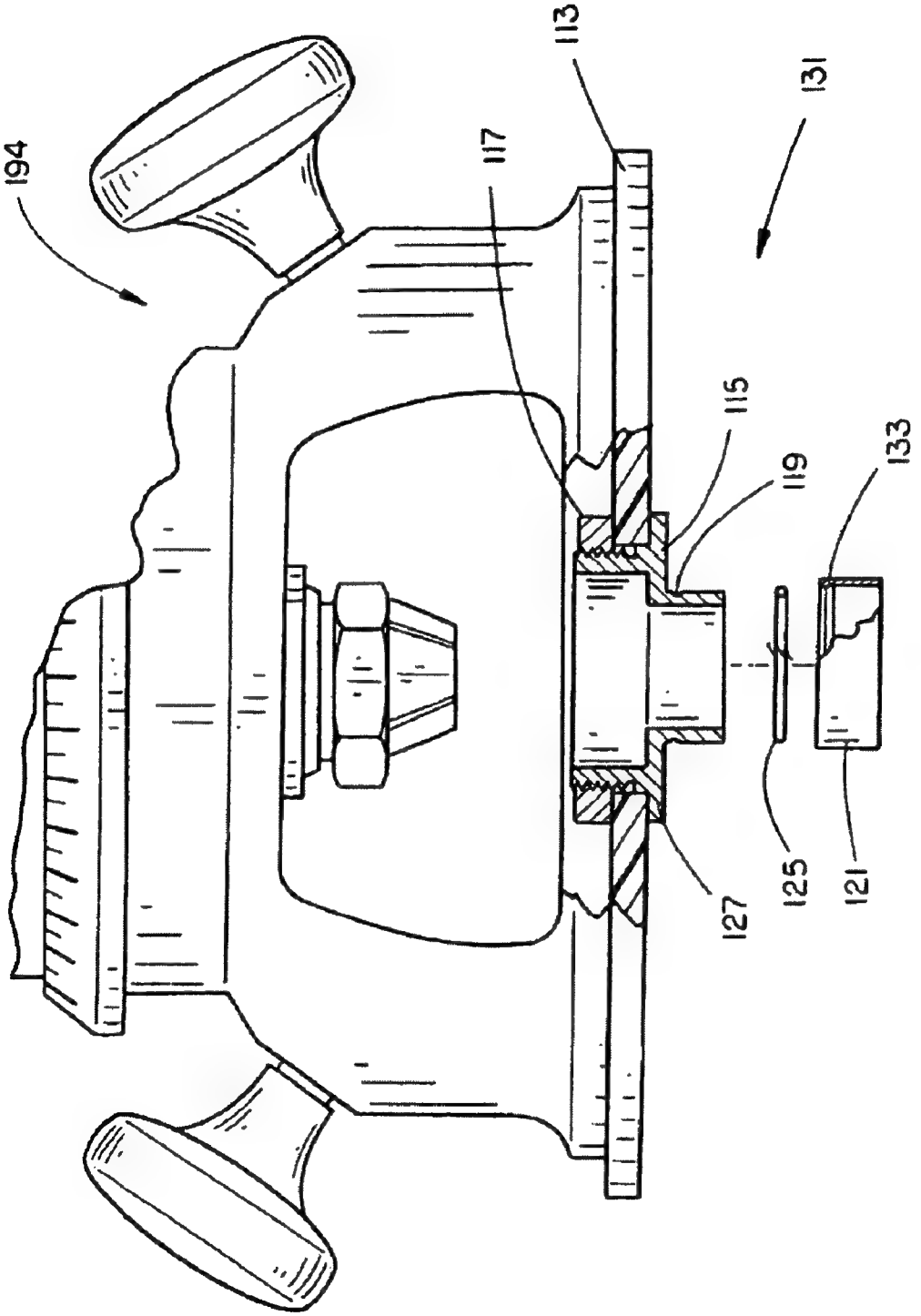


FIG. 28A

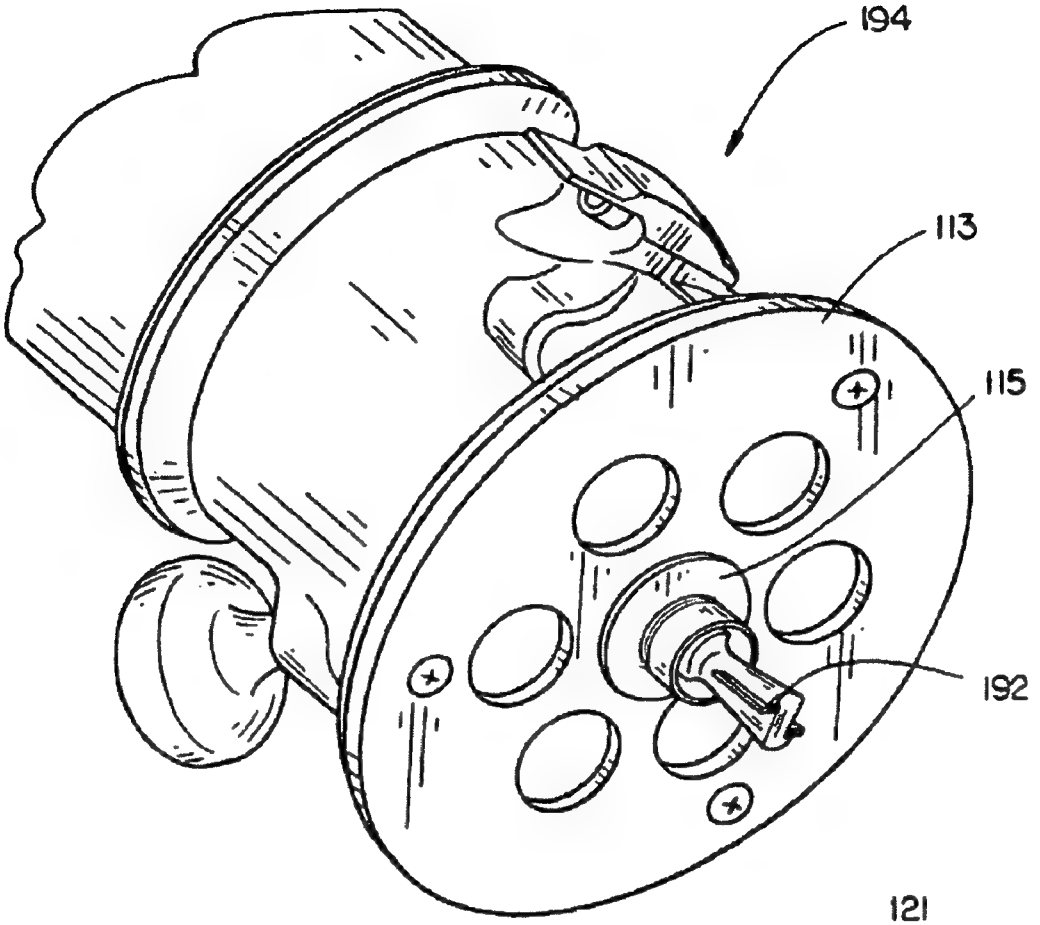


FIG. 28B

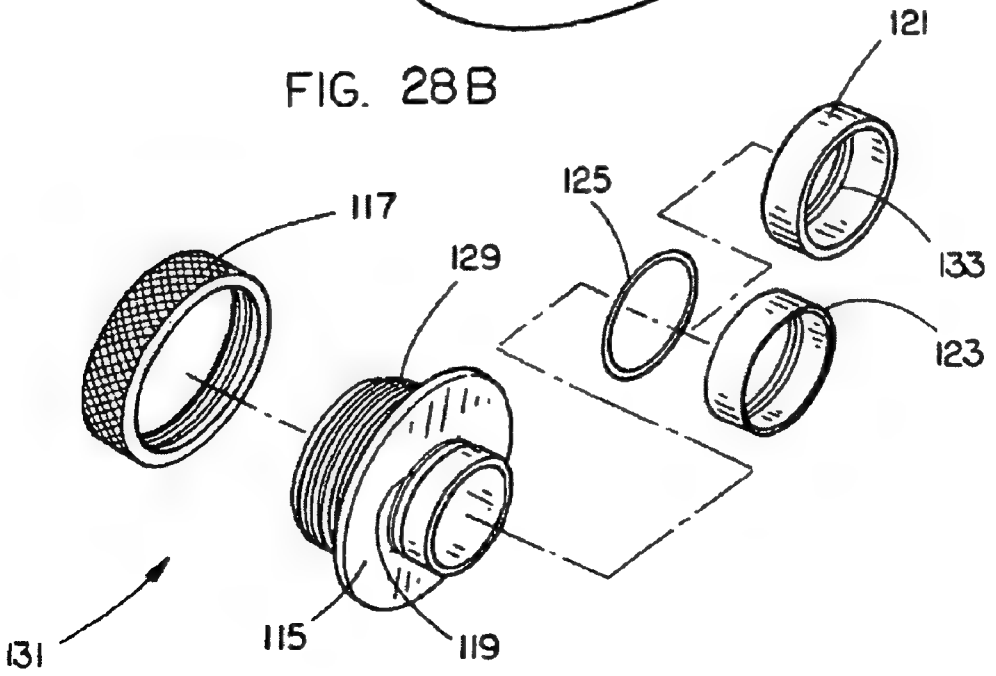


FIG. 29

ROUTER SUPPORT FOR A JIG APPARATUS

CROSS REFERENCE

The present application is a continuation of U.S. patent application Ser. No. 11/186,408, filed Jul. 21, 2005, now U.S. Pat. No. 7,455,089, which application claims priority under 35 U.S.C. §119(e) to U.S. Provisional Patent Application Ser. No. 60/592,734, filed on Jul. 30, 2004, and to U.S. Provisional Patent Application Ser. No. 60/664,053, filed on Mar. 22, 2005. Each previous application is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

The present invention generally relates to the field of woodworking and more particularly to joinery.

BACKGROUND OF THE INVENTION

The ability of a craftsperson to form fine joinery such as cabinetry is often the true measure of the person's woodworking skill. Poorly fitting joints may detract from the overall projects aesthetics and functionality, especially for fine cabinetry. Proper fit and assembly often require a high level of skill or a large time commitment on behalf of a novice woodworker. To aid in the process, a woodworker will often employ a jig or form to assist in proper joint formation. Too often these jigs tend to be complex to set-up for use, difficult to understand how adjustments impact the finished workpiece, and lack efficient methods for reestablishing commonly made joinery, such as dovetails, box joints, and mortise and tenon joints. Novice woodworkers may even tend to avoid forming fine joinery, instead selecting a simpler joint such as a butt-joint rather than attempt to implement a complex or non-intuitive jig. Expert woodworkers, in contrast, may become frustrated with the set-up time required for the jig device. The effectiveness of a jig may be judged on the ability of a user to rapidly set the jig for the desired joint in an intuitive manner.

Typical jig devices may lack the ability to form a wide variety of joints. As a result, a woodworker may have to obtain a different device in order to make a desired joint. For example, a user may own a jig for making drawers and an entirely separate jig for aiding in formation of a mortise and tenon joint to assemble a table leg and rail. In addition to the expense, these devices may consume valuable workshop space.

While some devices permit the formation of various types of joinery such as through dovetails, half-blind dovetails of various fixed spacings, and box joints, a user may tend to accept a lesser quality joint due to set-up errors, or be required to conduct lest cuts to ensure the desired fit is obtained. For example, if a router bit does not extend sufficiently, below the template, into a workpiece the resultant assembled workpiece, such as two sides of a drawer joined by a half-blind dovetail, may have a loose joint. Correspondingly, if the cutting bit extends too far into the workpiece the joint may be too tight. In either case, remedial action may be required for the pieces forming the assembled workpiece to meet user demands or another set of individual workpieces must be shaped. Other jig alignment issues may also affect the overall fit and finish of the resultant workpiece. Examples include the relative position of a template with respect to the workpiece. For instance, improper alignment of an end of a workpiece with respect to a template may result in a joint which is either loose or too light.

In additional instances, some existing jigs fail to offer convenient workpiece positioning and securing. For example, when forming half-blind dovetails in a single pass (when both the pins and tails are formed in a single operation) the workpieces are off-set from each other, along the length of the joint, to account for the spacing between pins/tails so that the workpieces align in the desired fashion. To accomplish the foregoing in a ½" (one-half inch) half-blind dovetail, the workpieces are off-set along their width or a secondary axis of the board by a ½" (one-half inch) to ensure at least a partial pin is formed on either end of the workpiece or board. Once properly positioned, a workpiece is required to be firmly secured to prevent inadvertent movement during a shaping or cutting operation. Difficulties with some securing devices include the inability of the securing device to effectuate both coarse and fine adjustment in a convenient manner. For example, some securing devices may be difficult for the user to secure while properly positioning the workpiece.

Commonly, joined workplaces are typically secured at right angles to each other. If a non-perpendicular joint is desired, a woodworker may be forced to hand form the joint or purchase/construct a jig for accommodating the desired angle. Typically, such non-standard joints are only attempted by experienced woodworkers who demand devices having full features. For example, a triangular table having three legs connected via a rail adjacent the support surface requires that a mortise and tenon joint be formed with an acute angle. As a result, in order for a jig to be considered for purchase by a skilled woodworker, the jig should offer the capability to form non-standard angular joints.

In addition to the difficulties experienced in setting-up the jig, dust and debris generated by operation of a hand-held router removing material, from the work piece during shaping operations, may be problematic to remove or tend to get caught between the router sub-base plate and the fingers/template. This may require a user to halt operations to remove the dust and debris away from the working area before recommencing operations. This may slow overall progress and become an annoyance to the woodworker.

Therefore, it would be desirable to provide an apparatus configured for aiding efficient, intuitive joint formation without the drawbacks experienced in the prior art.

SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to a jig apparatus for utilization in forming a variety of corresponding interconnecting structures for forming joinery between wooden workpieces.

In an aspect of the invention, a jig apparatus base having an intermediate zone configured to minimize or prevent inadvertent contact between a bit and the base is disclosed. An intermediate zone is constructed in the base to provide a void adjacent a cutting interface of a router bit in a workpiece which is secured to the jig apparatus. Suitable constructions include angled or stepped interfaces between a first side of the base and a second side of the base. Additionally, a recess or void may be constructed in the base between the first and second sides for preventing inadvertent contact.

In an additional aspect of the invention, a template mounting system is discussed. In embodiments, suitable template mounting systems include opposing slotted brackets, included on a template, received by a threaded lock-down knob system. In further embodiments, a mounting bracket includes an elongate rail for receiving a template including an aperture or channel corresponding to the rail. A template mounting system in accordance with the present aspect may

permit the utilization of a single template having multiple guides so as to provide increased versatility. The mounting system may allow for adjustable positioning with respect to a jig base having a first side and a second side orthogonally aligned to each other.

In a further aspect of the present invention, a visual alignment system may be included in the jig apparatus for assisting the user in proper alignment of the template with the workpiece/the base. In embodiments, a visual indicia or marker such as a scribed line may be included on a template, to be implemented with the jig apparatus, for providing a visual alignment for an edge of the workpiece/the abutment of workpieces to be shaped.

In another aspect of the present invention, a clamp assembly securing mechanism is disclosed. An exemplary clamp assembly may include a slideable mounting positioned on a threaded rod outwardly extending from the base. A threaded knob may be utilized to secure the mounting along the rod. A lock bar is pivotally coupled to the mounting. The lock bar may be formed or include an eccentric portion or cam portion for securing a workpiece disposed between the base and the lock bar. An engaging plate may be disposed between the lock bar and the workpiece in order to provide even application of force to the workpiece.

In a further aspect of the present invention, an adjustable angle workpiece mounting fence system may be included in the jig apparatus for permitting a user to vary the angular orientation of a workpiece with respect to a template. The main fence portion may be mounted via a pivotal trunnion coupling with spaced apart fence mounting brackets. A sliding auxiliary fence portion may be coupled to the main fence portion so a user may remove the auxiliary fence portion adjacent the template. Furthermore, a securing clamp may be coupled via a groove and rail system to the main fence portion for securing a workpiece to be shaped.

In an additional aspect of the present invention, a router bit positioning system is described. The router bit positioning system may promote efficient positioning of the depth of a router bit, or the extent to which a router bit extends beyond a router base/sub-base. A bit stop may be mounted to the base, an extension included on the template, or a dedicated housing in-line with a slot or recess included in a support surface (e.g., a template). The bit stop may be fixed at a pre-selected depth commonly implemented to offset distance or allow for adjustment such as by utilizing a threaded rod, screw or the like.

In another aspect of the present invention, a variable spacing router collar system may be included for utilization varying the spacing or the distance between an included router bit and a guide or form being traced. A generally cylindrical collar body may be secured to a router base or sub-base via a threaded locking ring engaging threading included on an outer surface of the collar body. A kit or series of outer sleeves and/or collar bodies having differing outside diameters may be attached about a portion of the collar body through a magnetic interaction or an intermediate elastomeric O-ring to effectuate different spacings.

It is to be understood that both the forgoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the invention as claimed. The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate an embodiment of the invention and together with the general description, serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The numerous advantages of the present invention may be better understood by those skilled in the art by reference to the accompanying figures in which:

FIG. **1** is an isometric view of a jig apparatus in accordance with an aspect of the invention

FIG. **2** is a general illustration of a resultant through dovetail joint formed in two workpieces;

FIG. **3** is a general illustration of a resultant half-blind recessed dovetail joint formed in two workpieces;

FIG. **4** is a general illustration of a resultant box joint formed in two workpieces;

FIG. **5** is a general illustration of a resultant sliding tapered dovetail formed in two workpieces;

FIG. **6** is a general illustration of a resultant mortise and tenon joint formed in two workpieces;

FIG. **7** is an isometric view of a jig apparatus of FIG. **1**, wherein the template is not present;

FIG. **8**A is an exploded view of a jig apparatus of FIG. **1** further illustrating placement of example workpieces;

FIG. **8**B is a cross-sectional view of a jig apparatus including example positioned workpieces;

FIG. **9** is a top plan view of an exemplary template in accordance with an aspect of the present invention;

FIG. **10** is a partial cross-sectional view of jig apparatus in accordance with an aspect of the present invention;

FIG. **11** is a partial exploded view of template mounting system and clamping mechanism in accordance with an aspect of the present invention;

FIG. **12** is a partial view of a workpiece stop being generally implemented for single pass half-blind dovetail formation;

FIG. **13** is an isometric view of a jig apparatus illustrating an exemplary workpiece stop and a template mounting system in accordance with an additional aspect of the present invention;

FIG. **14** is an isometric view of a jig apparatus including a removable template in accordance with an aspect of the invention;

FIG. **15** is a partial cross-sectional view of a router being implemented with a router bit positioning system in accordance with an aspect of the present invention;

FIG. **16** is a general illustration of a router bit positioning system integrated in a separate housing;

FIG. **17** is partial isometric view of a template including a fixed depth router bit positioning system;

FIG. **18** is an isometric view of a jig apparatus including a router support and a dust collection chute in accordance with an embodiment;

FIG. **19** is an isometric view of a dust collection chute in accordance with an exemplary embodiment of the present invention;

FIG. **20** is a partial isometric view of a template including variable position guide for forming a tapered sliding dovetail tenon;

FIG. **21** is an isometric view of a jig apparatus including a variable angle workpiece mounting fence in accordance with an exemplary embodiment;

FIG. **22** is a cross sectional view of the jig apparatus of FIG. **21**;

FIG. **23** is an isometric view of a template mounting bracket in accordance with an exemplary embodiment of the present invention;

FIG. **24** is a partial view of a template suitable for engagement by a mounting rail included in a template mounting bracket in accordance with an exemplary embodiment;

FIG. **25** is an isometric view of a jig apparatus including an adjustable finger template in accordance with an exemplary embodiment;

FIG. **26** is an exploded view of an adjustable finger template implemented for forming mortise and tenon joints in accordance with an exemplary embodiment;

FIG. **27** is an enlarged view of an adjustable finger template implemented for forming mortise and tenon joints in accordance with an exemplary embodiment;

FIG. **28**A is partial view of a router including an exemplary variable spacing collar system of the present invention;

FIG. **28**B is and exploded view of an exemplary variable spacing collar system; and

FIG. **29** is a cut-away view of a router including a variable spacing collar in accordance with an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to the presently preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings. It is to be appreciated that generally corresponding structures are provided with corresponding reference numbers. Additionally, while the present embodiments are directed generally to an apparatus in which a hand-held router is manipulated with respect to a fixed workpiece, the principles of the present invention may be equally applicable to an apparatus which is implemented with a fixed cutter such as in a router table, and the like devices for woodworking. It is the intention of this disclosure to encompass and include such variation.

Referring to FIG. **1**, in the present embodiment of the invention, a jig apparatus **100** is discussed. The present apparatus **100** may be implemented to assist in loaning a wide variety of joinery connections in an efficient manner.

Referring to FIGS. **2** through **6**, while not inclusive, representative joints formed in workpieces include: FIG. **2** illustrating a typical through dovetail joint wherein the pins/tails (having linear angled sides) are observable along both sides of the connection; FIG. **3** illustrating a half-blind dovetail joint wherein the joint is generally observable from one side (in the present instance the half-blind dovetail is recessed towards the interior of one of the workpieces such as by rabbeting material from the edge of the workpiece); FIG. **4** illustrating a box joint wherein the pins/tails (having linear sides which are generally perpendicular to the end of the workpiece); FIG. **5** illustrating a sliding tapered dovetail wherein the tongue/groove include a generally trapezoidal shape; and FIG. **6** illustrating a mortise and tenon wherein the a generally rectilinear tongue is inserted into a blind generally rectilinear recess. Those of skill in the art will appreciate that the foregoing descriptions and the accompanying figures are only generally illustrative as some curvature may occur due to operation of a rotating bit generally following a template.

Referring again to FIG. **1**, a base **102** is included in the jig apparatus **100**. In the present example, the base **102** is formed by bending a sheet of metal having appropriate rigidity, durability, and the like into a generally rectangular configuration. Suitable materials include steel, aluminum based alloys, and the like. In further embodiments, the base may be formed from other materials such as plastics or cast metal, and the like having sufficient rigidity and durability. The base may include a flange **104** or the like for assisting in clamping or otherwise securing the jig apparatus **100**, such as by utilizing a fastener, to attach the apparatus along an edge of a workbench or other suitable surface. In the current embodiment, a first side **106** of the base is substantially perpendicular to a second side **108** of the base for forming standard joinery.

Preferably, the interface between the first **106** and second **108** sides is angled **110** such that the first side and the second side do not meet in a right angle orientation. In further embodiments, such as illustrated in FIG. **13**, the interface between the first side and the second side includes an intermediate stepped or recessed zone **205**. Inclusion of an angled side **110** (FIG. **10**) or a stepped zone **205** (FIG. **13**) may minimize or prevent inadvertent contact between a cutter (e.g., a router bit) and the base **102** as a user manipulates the router relative to the base. Other configurations may be implemented as well, for example, a void or recess may be formed between the first and second side in order to provide a clearance space in the base adjacent an end of the workpiece.

For example, as may be generally observed in FIGS. **7**, **8**A, and **8**B, when culling a half-blind dovetail in a single pass, or performing a unitary operation, the two workpieces **112**, **114** to be shaped are aligned on the jig apparatus. The first, vertical workpiece **112** is aligned with the first side **106**, and the second, horizontal workpiece **114** is aligned with the second side **108**. The respective ends of the workpieces **112**, **114** are brought into abutment (as observed in FIG. **8** B) typically with the edge of the first board **112** extending flush with the top surface of the second board **114**. Inclusion of an angled side **110** defines a void **124** at the interface of the workpieces adjacent the first and second side of the base. In this fashion, as a router/router bit follows a guide **116** of a template **118**, the router bit is unlikely to inadvertently contact the base **102**. (The guide being one or more formations or extensions configured and designed to be generally traced by the operation of the router bit in the workpiece.) The void **124** or recess between the workpieces and the base may minimizes the likelihood that a router bit may contact the base such as if the router is lipped or angled with respect to the template during utilization. In another example, when cutting through dovetails an angled side **110** may prevent inadvertent contact between the router bit and the base **102** as the router bit may extend a distance beyond the thickness of the workpiece being formed.

With continued reference to FIGS. **7**, **8**A, and **8**B, in a further example, the first side of the base **106** is formed to extend below the flange portion **104** and below the top surface **201** of the structure **126** supporting the jig **100**. Extending the first side **106** beyond the support structure top surface **201** permits the first side **106** to contact an edge **203** of the support structure **126** thereby orientating the jig **100** on the support structure, minimizes movement of the jig on the support structure, and the like.

In the present embodiment, the base **102** is configured to implement a template **118** having multiple brackets **120** (one is referenced). Utilization of a multiple bracket system may permit reversal of the template or positioning a guide adjacent the first side **106**, thereby increasing versatility of the template. For example, as illustrated in FIGS. **8**A, **8**B, **9**, and **10**, the template **118** includes a first guide **116** for forming a tail of a through dovetail (additionally this guide may be utilized for a half-blind dovetail and a box joint as well) and a second guide **122** for forming through dovetail pins. The through dovetail pin guide having generally angular sides of the individual extensions. In the present example, two opposing brackets **120***a*, **120***b* are unitarily formed as a generally

U-shape attachment fastened to the main body **128** of the template **118**. Each of the brackets **120** includes a terminal end slot **132** for mounting on an outwardly extending threaded rod **138** (one is referenced), when in use. Those of skill in the art will appreciate the brackets may be formed individually and separately connected to the main body, integrally formed with the main body **128** (e.g., by bending the brackets generally perpendicular to the main body **128**), and the like. The brackets **120***b* not being used to secure the template **118** to the base **102** may be received in a recess or aperture **136** (one is reference) formed in the base **102** to permit adjustment of the template toward/away the first side **106** (as indicated by arrow **148**) and up/down relative to the second side **108** (as indicated by arrow **183**). Two recesses/apertures **136** are included to prevent the unused brackets **120***b* from interfering with operation of the jig.

Referring to FIGS. **1**, **8**A, **8**B, **10** and **11**, a template mounting system **150** in accordance with an embodiment is described. The template mounting system **150** may permit reversal of a template **118** having two guides **116**, **122** by implementing two-spaced apart assemblies. In this manner, a first guide may be utilized for forming a first type of joint (e.g., a ½" (one half inch) fixed spacing half-blind dovetail) while a second guide on a second side of the template is configured for forming a second type of joint (e.g., a sliding tapered dovetail) when the second guide is directed towards the front of the jig apparatus (as may be observed in FIG. **1**) or first side **106** of the base. In the current embodiment, the mounting system **150** includes an outwardly extending threaded rod **138** secured via a nut, adhesive, a weld, or the like for preventing the rod **138** from becoming dislodged or lost from the base **102**. Securing the rod **138** to the base **102** may prevent rotation of the rod as various components are threaded into engagement with the rod. The threaded rod **138** may be positioned in order for the jig apparatus to accept a wide variety of workpieces having varying thickness. In the current embodiment, a nut such as a knurled nut **142** having an internal threading corresponding to the threaded rod is engaged with the rod **138**. Other suitable devices include, a wing nut with the wings directed inwardly towards the base, a knob having a flange, and the like. In the current embodiment, the nut **142** may act as a stop for defining the front-to-back position of the template **118** with respect to the first side **106** as generally indicated by arrow **148**. For example, if a thinner piece of lumber is to be positioned against the first side **106**, the nut **142** may be spaced closer to the first side of the base while a larger workpiece may require the nut **142** be positioned further away. Moreover, adjustment of the template towards/away **148** from the first side **106** may be especially useful for positioning the template when a piece of scrap material, or a sacrificial piece of material, is disposed between the base and the workpiece for preventing tear-out on the back side of the workpiece, i.e., the side adjacent the base. In addition, when culling through dovetail pins, manipulating the template towards/away **148** from the first side **106** may influence the lightness of the joint. For instance, positioning the nut **142**, and thus, the template **118**, closer to the base may result in a looser joint than if the nut and template (the template bracket) are disposed further away from the base **102** for the same workpiece. An additional nut or knob **146** having a threaded aperture may be utilized to secure the template bracket **120** in a desired position.

In the present embodiment, the position of the template **118** with respect to the second side **108** of the base (e.g., the vertical position as may be observed in FIG. **10**) may be varied by positioning the bracket with respect to the threaded rod **138** (generally represented by arrow **183**). The bracket slot **132** may be configured for permitting efficient adjustment for the range of workpiece thickness expected to be secured along the second side. With particular reference to FIGS. **8**A and **10**, a workpiece **114** may be positioned on the second side **108** of base **102**, and the template bracket **120** may be slid down around the threaded rod **138** until the main body **128** of the template **118** contacts the workpiece **114** at which time the securing knob **146** may be lightened against the bracket **120** to fix the template's position. Additionally, while an end slot **132** is preferable so the knob **146** does not have to be removed during assembly, a through aperture may be employed as well. In a further example, the template **118** may be spaced a desired distance away from the workpiece so as to allow workpiece removal without adjustment of the template. In the described manner, the jig apparatus **100** may be set-up for repeated operations requiring repeated positioning and removal of workpieces such as for all the drawers having the same thickness for a project.

With reference to FIGS. **8**B, **9**, and **17**, in an aspect of the present invention, a visual alignment system for inclusion in a jig apparatus is disclosed. Previously, users may have experienced some difficulty in aligning the template in order to prevent the template from being skewed with respect to the workpiece(s), thereby resulting in pins/tails of differing lengths, or requiring time consuming measuring and set-up. In the present embodiment, an alignment marker or indicia is included on a template for aiding in alignment of the template with the workpiece. Suitable alignment markers include printed, embossed or painted indicia, an etched, or engraved marker, or the like for aiding visual alignment. Alignment markers include a line, an arrow, two-spaced apart lines, a cross-hair, alignment dots, dashed lines, and the like. Other suitable systems include, apertures having alignment markers or visual indicators, or transparent windows having visual markers. For example, with previous jigs, a user had to estimate or measure to determine that the template was properly aligned with the end of the workpiece to be formed. The alignment system of the present invention may allow the user to visually align an appropriate marker or indicia to the workpiece in order to ensure proper alignment. For example, when cutting or shaping a hall-blind dovetail in a single pass, a user may align a scribed line **130**, included on the main body of the template **118** with the interface between a first workpiece **112** disposed along the first side **106** of the base (e.g., in a vertical orientation) and a second workpiece **114** disposed along the second side **108** of the base (e.g., in a horizontal orientation). As may be generally observed in FIG. **8**B, should the template not be in alignment with the half-blinding dovetail alignment line **130**, a user may manipulate the template towards/away from the first side of the base until the alignment line coincides with the interface of the first and second workpieces. Those of skill in the art will appreciate that a variety of indicia or markers may be included for aligning guides for other types of joints. For example, as may be observed in FIG. **9**, additional indicia may be included for the different types of joint guides such as an alignment marker **134** for the tails for a through dovetail and an alignment marker **143** for through dovetail pins. For example, when cutting the pins of a through dovetail, a user may align the edge of the workpiece in which the pins are to be formed with the alignment marker **143** included on the template guide **122** for through dovetail pins.

Referring to FIGS. **13**, **14**, **23**, and **24**, a template **193** and template mounting system **181** in accordance with an additional aspect of the present invention are disclosed. The template and template mounting system of the present invention may permit efficient template positioning and set-up for the jig apparatus. More particularly, the template mounting sys-

tem **181** of the present aspect may allow for front-to-back positioning (i.e., positioning with respect to the first side of the base **106** (as generally illustrated by arrow **179**, FIG. **14**)). Additionally, the mounting system **181** may permit vertical adjustment of the template (i.e., adjustment with respect to the second side of the base **106** (as generally illustrated by arrow **183**, FIG. **23**)). In a preferred embodiment, a pair of spaced apart template mounting brackets **139** (one is referenced) is secured to generally opposing ends of the base.

In the current example, the mounting system **181** includes a template mounting rail **141** included on a template mounting bracket **139**. The mounting rail may be unitary with a base mounting **187** or may be secured via fasteners to a base mounting **187**. For example, the mourning rail may be aligned generally perpendicular to the first side **106** of the base for front-to-back alignment. The mounting rails may be shaped/disposed so as to minimize and/or eliminate skewing of the template along the mounting rails. The template mounting rail may be configured as a rod or geometrically shaped elongate extension. As may be observed in FIG. **24**, in the present example, a template **193** for use with the mounting system includes a recess **195**, a channel, or an aperture corresponding to the rail cross-section to permit engagement of the template along the rail. For instance, the template recess **195** extends generally perpendicular to the main axis or length of the template **193**. In the foregoing example, a thumb screw **197** may be coupled to the template for fixing the position of the template **193** along the mounting rail during utilization.

With particular reference to FIGS. **13** and **23**, the base mounting **187** may include a slot for receiving a threaded rod such as an outward extending bolt or the like for securing the template mounting bracket **139** in a desired position. Those of skill in the art will appreciate the template mounting bracket **139** may, alternatively, include a threaded extension which is received through a slot formed in the base for substantially the same purpose. In the current example, a knob **191** having a threaded aperture or recess may be secured to an outward extending threaded rod which extends through the base mounting slot **189** for permitting adjustment of the template mounting system **181**/the template **193** as may be generally illustrated by arrow **183** (FIG. **23**). The base mounting **187** may be variously shaped in order to minimize misalignment and the like. As may be observed in FIG. **23**, the base mounting **187** may include a hexagonal or the like sided cross-section (with a corresponding recess or aperture formed in the base) for preventing movement of the template/mounting system **181** during utilization.

In a further example, the template mounting system **181** may include a mounting stop **199** (one is referenced) or a series of mounting stops (which may be fixed or adjustable) for aiding in positioning of the template along the mounting rail. Those of skill in the art will appreciate an adjustable stop may be mounted to a template for a substantially similar purpose. For instance, an adjustable stop **199** may be included for contacting the template **193**, a stop **200** extending from the template **193**, or an adjustable stop mounted to the template so as to permit positioning along the mounting rail **141**. In this way, a user may set the alignment of a particular guide included on a template and repeatably position the template having the guide to the desired position for a variety of different guides. Adjustable positioning of the template along the mounting rail **141** may accommodate various sized workpieces, permit adjustment of the tightness/looseness of the joint, permit utilization of a sacrificial backer for preventing tear-out, and the like. Preferably, corresponding stops are included on the template mounting brackets **139** disposed at either end of the base. Additionally, a stop may be removable and/or replaceable to allow for the implementation of different router bits. In a further advantageous embodiment, a series of stops, being offset from at different locations from the mounting rail, are included to allow for front-to-back positioning (position along the mounting rail **141**) for different guides. In a further example, a stop may be included on the mounting bracket **139** for contacting a corresponding stop **200** on a first side of the template while a second stop is included on the mourning bracket for contacting a second stop **202** disposed on an opposite side of the template. The stops included on the template **193** being disposed at differing locations along a primary length of the template **193**. In the foregoing manner, a series of different templates, each having different guides, may have established stops for the included guides. Examples include a stop for through dovetail pins, a stop for through dovetail tails and or half-blind pins/tails, and the like guides. The adjustable stop may be constructed as a threaded rod, a screw, or the like in threaded engagement with a threaded aperture included in the mounting bracket **139**. Other securing systems such as a rack and pinion system, a smooth shaft and set-screw, or the like may be implemented as well.

With reference to FIGS. **25** through **27**, an adjustable finger template **204** for utilization in forming various joints such as through dovetails and half-blind dovetails, is described. The template of the present invention may provide a guide for forming joints of differing dimensions such that the pins/tails forming the joints may be sized as desired. Those of skill in the art will appreciate the principles of the present embodiment may be implemented for templates for different joints, such as for a mortise and tenon joint and the like, without departing from the scope and spirit of the present invention.

An adjustable finger template **204** in accordance with an embodiment includes a first end mounting **220** having a through aperture for reception by a mounting rail **141**. A second end mounting **222** may be connected to the first end mounting via a template rail **206** extending between the end mountings. Additional rails may be included for preventing twisting of the template during utilization. A plurality of individual fingers may be slid on the template rail **206** the desired position. The individual fingers **208**, **210** (two are referenced) may be contoured in a variety of shapes based on the joint to be formed. Individual fingers may be secured via a set-screw or the like to fix their respective positions along the template rail **206**.

In the present example, a through aperture **224** is included in the individual fingers for permitting passage of a depth stop rod or bar **214** through the fingers. For instance, the depth stop bar **214** may act as a stop for a router guide collar when forming a joint, so the router is prevented from extending inwardly between two adjacent fingers. In the foregoing manner, a user may be prevented from inadvertently removing excess material from the workpieces when forming half-blind dovetails. The depth stop bar **214** may be removed when culling through dovetails, as the bit is allowed to pass entirely through the workpiece.

When utilized for forming a mortise and tenon joint, a removable support **216** may be attached to the adjustable finger template **204**. The removable support **216** may be attached via a rail system in a substantially similar manner as the template mounting system **181**. Referring to FIG. **20**, in a further example, a guide for forming a sliding tapered dovetail tenon may be coupled via a rail to permit implementation of a different material for a portion of the template. Referring to FIGS. **25** through **27** again, a rail or rod **226** connection between the adjustable finger template **204** and an end mount-

ing **232** of the removable support **216** may permit adjustable positioning of the support **216** adjacent the fingers **208**, **210** so that mortise and tenons of different dimensions may be formed. For example the removable support **216** may be spaced away from the template rail **206** sufficiently to allow for the formation of a ½" (one-half inch) mortise and tenon. For example, the removable support is disposed away from the template rail equal to the diameter of the mortising template guide (discussed below). The removable support may be additionally space further away if a larger joint component is desired. Additionally, template supports **218** and **228** may be included for providing a substantially planer surface for a router to at least partially rest upon. A template support **228** positioned adjacent the removable support **216** may be disposed on a side of the fingers **208** and **210** opposite the removable support in order to sandwich the fingers and to engage removable inserts **212** and **230** for forming curved corners of the mortise and tenon. The inserts **212** and **230** may be sized for commonly formed mortise and tenons. In embodiments, the inserts may be assembled from multiple sections to permit fine mortise and tenon size adjustment. Examples include ½" (one-half inch) inserts, ⅜" (three-eighths inch) inserts, and ¼" (one-quarter inch) inserts. The inserts **212**, **230** may be snap fit to an adjustable finger **208**, **210**, sandwiched between the removable support **216** and a template support **228**, and the like. In further embodiments, a dedicated mortise and tenon jig may be configured in a substantially similar manner.

Referring to FIGS. **1**, **8**A, **8**B, and **11**, a securing mechanism in accordance with an embodiment of the invention is discussed. In the present embodiment, a clamp assembly **140** is utilized to secure a workpiece in a fixed position with respect to the base/template. It is to be appreciated that while the clamp assembly **140**, disposed adjacent the first side **106**, is discussed, an additional securing mechanism **270** may be positioned adjacent the second side **108**. The clamp assembly **140** permits efficient coarse and fine adjustment in order to permit rapid workpiece securing.

In the current example, a threaded rod **144**, a bolt, or the like extends outward from a portion or side of the base **102** to which the workpiece is to be clamped. The threaded rod or bolt may be secured to the base via a weld, an adhesive, a nut **185**, via threaded engagement with a threaded aperture in the base, or the like, to prevent rotation of the rod as the clamp assembly components are manipulated. In further embodiments, the knob may include a threaded rod which engages with a threaded aperture in the base. In this manner the clamp assembly may be removed such as when attaching a adjustable angle fence or when a user wishes to have a flush surface. During utilization, a workpiece **112** such as a wooden board may be sandwiched between a surface **106** of the base and the clamp assembly **140**. In the present embodiment, a threaded rod extends from each of the left and right edges of side **106** of base **102** in order to promote even clamping pressure along the width of the workpiece **112**. A mounting block **152** is mounted on the threaded rod **144**. In the current embodiment, the mounting block **152** includes a through aperture so that the mounting block may slide along the threaded rod **144**. A lock bar **154** is pivotally coupled to the mounting. For example, the lock bar **154** may have a terminal portion which forms a trunnion for which a corresponding aperture or recess is included in the mounting.

In the current embodiment, the lock bar **154** includes an eccentric portion **156** which is secured to the generally cylindrical lock bar **154** via a set screw **166** or the like for fixing the eccentric portions so that manipulation of the lock bar results in securing/releasing of the eccentric portions. Preferably, the eccentric portions are spaced apart to ensure that a proper securing force is applied generally along the length of the lock bar. In a further embodiment, multiple eccentric portions are implemented or cam portions are included. Moreover, the lock bar may have a variety of multi-sided geometric shapes, with a correspondingly shaped aperture in the eccentric or cam portion, so that rotation of the lock bar results in rotation of the eccentric portion. In further embodiments, the lock bar may be shaped/configured as an eccentric or cam or have integrally included eccentric or cam portions. Including separate cam portions may promote efficient manufacture, reduce material cost, and the like. The eccentric portion **156** may be formed of a durable plastic or the like having sufficient rigidity to withstand workpiece clamping pressure.

A workpiece engaging plate **158** may be included for providing substantially even pressure across a workpiece/engaging plate zone. Inclusion of a plate **158** may prevent the eccentric portions **156** from marring or otherwise damaging the workpiece **112** if excessive pressure is applied by the lock bar **154**, as well as providing increased surface area. An engaging plate **158** may include surface texturing, a coating, or material, directed toward the surface of the base, for aiding workpiece engagement. In further embodiments, an engaging plate may include edges to form a trough or form a partial enclosure generally about the lock bar **154**. Additionally, the lock bar and or the mounting block **152** may be biased away from the base to permit efficient insertion of a workpiece between the base **102** and the securing mechanism. For example, a compression spring **160** may be disposed about the threaded rod **144** between the base **102** and the engaging plate **158** in order to force the engaging plate and lock bar generally away from the base to facilitate workpiece insertion when the clamp assembly **140** is not in an engaged condition.

With continued reference to FIGS. **1**, **8**A, **8**B, and **11**, in the current embodiment, an adjustable knob **162** (which may be substantially similar to knob **146**) is in threaded engagement with the threaded rod **144**. It is to be appreciated that the knob may include a separate nut having a threaded aperture corresponding to the threaded rod **144** or be integrally formed with a threaded aperture. The knob **146** may include protrusions and/or surface texturing for promoting ergonomic grasping/manipulation. When securing a workpiece, a user may position the workpiece **114** to the desired location between the base **102** and engaging plate **158**, the knobs **162** generally on either end of the lock bar are threaded towards the base until the mounting **152**/lockbar **154** are positioned or slid sufficiently close to the workpiece **112** in order for the eccentric portions **156** to sufficiently engage the workpiece to prevent movement of the workpiece during shaping or routing operations. Those of skill in the art will appreciate that the steps/order of the foregoing method are exemplary only and are not to be understood as limiting. Once the knobs are threaded to the desired positions the lock bar **154** may be rotated utilizing a lever or handle **164** fixed to the lock bar, thereby clamping the workpiece. In the foregoing manner, the clamping assembly may function to permit coarse adjustment via the threaded knob and fine adjustment via implementation of the eccentric/lock bar.

Referring to FIGS. **1**, **7**, **8**A, and **12**, in a further aspect of the invention, a workpiece stop **168** is disclosed. In the present embodiment, the workpiece stop is unitary. In further embodiments, an adjustable workpiece stop may be included in the jig apparatus. The workpiece stop of the present aspect permits efficient positioning for various types of joints. The workpiece stop of the present aspect may allow for common adjustment for workpieces disposed on either the first or second side.

In particular, when cutting half-blind dovetails in a single pass, or operation, the two workpieces forming the joint are required to be offset from each other so as to align the edges of the workpieces to each other. For example, as may be best observed in FIG. **12**, the position of the workpieces along the template must be offset so that each extension or pin **170** is received in a corresponding socket or recess **172** formed in the opposing workpiece. Typically, it is desirable for a half pin to be formed on either side of one of the workpieces so the joint appears uniform. As a ½" (one-half inch) fixed half-blind dovetail joint is the most common joint formed, it is desirable that the workpiece stop **168** have an edge which is offset by ½" (one-half inch) to accommodate this spacing. Those of skill in the art will appreciate the workpiece stop may be configured for other spacings (e.g., with the offset being the width of the pin/tail). Thus, a workpiece stop may include a first end **174** having an edge (along a side) which is offset from a second end **176** having an edge (along the side) such that workpieces disposed against the stop are offset the selected distance. Additionally, the generally opposing side of the workpiece stop **168** may be straight or in-line between the first and second ends so a uniform position may be established for positioning a workpiece along either the first side **106** or second side **108** of the base.

In a preferred embodiment, at least two workpiece stops are included in the jig apparatus **100** such that the workpiece stops may be swapped from left/right (as may be generally observed in FIG. **7**). As the offset side of the workpiece stop, in the current embodiment, forms a handedness, reversal of the left handed stop for the right handed stop will result in the straight or aligned side being directed towards the area in which a workpiece is received in the jig.

In the current embodiment, a workpiece stop includes a slot **178** extending generally from the aligned side to the off-set side of the stop such that the right/left positioning of the workpiece may be finely adjusted thereby permitting adjustable and repeatable workpiece positioning along the length of the template. A fastener such as a screw **180**, in threaded engagement with the base, or other releasable securing device may be utilized for securing the workpiece stop **168**. For example, a user may wish to vary the position of the workpiece along the template. In this fashion, a user may select where the edge of the workpiece is located with respect to an extension or finger included on the template. In additional embodiments, portions of the workpiece stop **168** may include a contoured edge such as a half-circle recess to accommodate a threaded rod such as may be included in a template securing system, a clamping assembly, or the like to maximize the area in which a workpiece may be positioned or the size of workpiece which may be accepted.

Referring to FIG. **13**, in an alternative embodiment, a multi-component workpiece stop **182** is included in a jig apparatus **100**. While the jig of the present invention is implemented with a base having an intermediate stepped or recessed zone, the components of the workpiece stop may be configured to conform to an angled intermediate portion as well. In the present instance, the workpiece stop **182** includes a first workpiece stop portion **186** for alignment generally on a first side **106** and a second workpiece stop portion **184** for alignment on the second side **108**. In the current embodiment, the first and second portions may be secured via a fastener while a slot formed in at least one of the portions is utilized to permit sliding adjustment with respect to the base, such as if a fastener extending through the slot engages with a threaded aperture in the base **102**. The workpiece stop may include corresponding apertures, which may include threading for engaging the fastener, merely permit passage of a fastener, a slot such that one of the components may be repositioned with respect to the fastener/aperture included in an opposing workpiece component. In further embodiments, the workpiece stop **182** may be configured such that one portion such as the second portion **184** is disposed in a fixed position while the first portion is slideably adjustable. For example, the workpiece stop **182** may permit adjustment of the relative position of one of the workpieces with respect to another workpiece to be disposed along the other side of the jig. For example, a user may vary the distance that the workpieces are offset from each other while having the ability to reposition the entire workpiece stop without having to adjust the relationship of the portions of the stop (i.e., realign the first portion with respect to the second portion).

With reference to FIGS. **14**, **21**, and **22**, an adjustable angle workpiece mounting fence system **155** in accordance with an aspect of the invention is disclosed. The fence system **155** may permit a user to vary the angular orientation of the workpieces forming the joint as desired. For example, a user may be capable of forming a dovetail joint for an angle other than 90.degree. (ninety degrees) such as to form a decorative box or the like. While the angle mounting system of the present invention is implemented as a removable attachment, those of skill in the art will recognize the system **155** may be integrated into a jig apparatus **100** without sacrificing the advantages described herein.

As may be best observed in FIG. **14**, a pair of spaced apart fence mounting brackets **157**, **159**, respectively, are secured to the base **102** via fasteners or the like. In an embodiment, the brackets **157**, **159** are secured on either side of a base flange **104**, adjacent the first side **106**. Referring to FIGS. **21-22**, the main fence portion **161** may be pivotally coupled to the mounting bracket via a trunnion **163** received in a recess or aperture **173** included in the fence mounting brackets. Angular positioning of the workpiece fence system **155** may be accomplished by including at least one of an extension **171** or a portion of the main fence **161** having an arced slot **175**. The angular position of the main fence **161** may be secured via a locking system such as a threaded knob **165**, a bolt, a wing nut, a screw, or the like for engaging the material defining the arced slot. Preferably, an adjustable or sliding fence portion **267** (FIG. **22**) may be coupled to the main fence **161** via a mechanical interconnection such as a grove **169**, rail or the like. Inclusion of a sliding fence portion **267** may permit removal of the sliding fence portion when support is unnecessary or when inclusion of the sliding fence portion would interfere with the operation to be performed. For example, a user may select to remove the sliding fence portion **267** when cutting a tenon to be included in a mortise and tenon joint in order to provide clearance about the area in which the router bit is to be manipulated. In further examples, a recess or aperture **177** may be included in the sliding fence portion such that a user may align the recess as necessary to permit proper bit clearance while supporting a workpiece along the fence system **155**.

Additionally, a securing system such as a securing clamp **167** may be included in the mounting fence system **155**. In the present embodiment, a series of lockdown clamps are slide mounted to the main fence portion **161**. In an example, a lockdown clamp is removable from the main fence portion **161** to accommodate workpieces having dimensions approximately equal to the maximum sized workpiece which may be accepted. Adjustable securing may allow for efficient securing for workpieces having various dimensions without the need for a separate clamping device. For example, the clamps may be coupled via a tabbed extension, a rail portion, or the like for engaging with a lipped groove to permit adjustment

along the primary length of the main fence portion **161**. Those of skill in the art will appreciate a wide variety of mechanical interconnections may be implemented to permit adjustable workpiece securing. Suitable securing systems may include spring biased clamps, threaded clamps, cam or eccentric clamping system, and the like for securing a workpiece during routing operation.

Referring to FIGS. **1**, **7**, **9**, **10**, and **15**, a router bit positioning system **188** in accordance with an aspect of the present invention is discussed. One drawback to forming joints utilizing a router is the need to properly position the depth of the router bit or the extent to which the router bit extends beyond the base and/or a sub-base plate of the router. This may become a time consuming task as a user fine tunes the depth of the router bit. The router bit positioning system **188** of the present invention may eliminate the need to perform lest cuts, or eliminate having to measure the depth of a router bit utilizing a ruler or measuring tape. For example, some woodworkers select to leave the tails included in the joint long so they may sand them off, this may require precise measuring which may tend to be tedious. The router bit positioning system **188** may permit the user to set a router bit positioning stop or utilize a pre-selected bit depth stop to allow for repeated positioning of the depth of the router bit. In a first embodiment, a slot **190** or recess is included in the template **118**. Preferably, the slot may be sufficient size to accept a router implementing a collar guide generally disposed about the shank of the bit. In additional embodiments, a through aperture may be utilized as well, with the aperture being of sufficient size to allow passage of the desired bit and/or collar. Referring to FIG. **15**, for example, a slot extending in from an edge of the main body of the template **118** may permit the user to rest the router **194** on the template **118** and adjust the depth of the router bit **192** to the bit stop **103** (the through dovetail bit stop). In further embodiments, a separate housing may be included for one or more router bit positioning systems. In this example, the housing may function substantially as the template for resting a router thereon (as may be generally observed in FIG. **16**).

Referring to FIGS. **1**, **7**, **9**, **10**, and **15**, bit stop **196** (a half-blind bit stop in the present example) may be adjustable to allow a user to adjust the pre-selected depth as desired. For example, in an initial set-up procedure a user may adjust the position of the stop **196** so that he/she may reposition the bit to that relative position for the template guide selected without having to conduct test cuts or attempting to measure the extend to which the bit extends for the desired joint. Those of skill in the art will appreciate that multiple router bit positioning stops may be included such as a stop system for the pins of a through dovetail, a stop system for the tails of a through dovetail, a stop system for a half blind dovetail, and the like as desired. In the present embodiment, the adjustable bit stop includes a threaded portion such as a rod **101** for threading engagement with a threaded aperture included in the base, formed in a separate mounting or included on the template itself (such as mounted on a tabbed portion of the main body of the template or included on a mounting bracket attached to the template) as desired. For example, when included on a template, the threaded bit stop may engage a tab portion of the template below a support surface formed by the main body of the template **130**. A nut **198** or the like may be included for ensuring that the bit stop **196** is not inadvertently adjusted.

Those of skill in the an will appreciate that the selection of mounting surface (e.g., the base, an extension on a template, a separate mounting, or the like) for the bit stop may depend on the type of joint to be formed. For example, in a half-blind dovetail the depth of the pins relative the sockets may be varied. For example, a user may vary the depth to which material is removed from the two workpieces. This may be best exemplified by the case of a half-blind dovetail in which the pins/sockets are formed in a single operation. Considerations in the foregoing example include, but are not limited to the ability of the workpiece forming the sockets to hide the joint, the ability to assemble, form a sturdy joint (the ability of the pins to engage the sockets), and the like. The same considerations may apply for various other joints such as a tapered sliding dovetail or a sliding dovetail dado. In this instance, a bit stop may be mounted to the template as the selection of the extensions/sockets may be varied. In contrast, when culling a through dovetail or a box joint which extends through the workpieces (i.e., is generally observable from two sides) the overall thickness of the workpieces may be taken into account when forming the joint. In consideration of this, an adjustable bit stop **101** for the pin/tails of a through dovetail system may be mounted to the base **102**, such that the thickness of the workpieces may be taken into account (due to the spacing of the template away from the base substantially equal to the thickness one of the workpieces (typically the workpiece to include the pins)). For example, the position of the slots in the template and the location of the adjustable bit stop **101** on the base may permit a user to reverse the template such that the fingers or protrusions forming the respective guides (FIG. **9**, tails **116** and pins **122**) are positioned adjacent the first side of the base.

Referring to FIG. **17**, a fixed position router bit stop is discussed. In the present embodiment, a series of fixed bit stop systems corresponding to a ½" (one-half inch) depth **107**, a ⅜" (three-eighths inch) depth **109**, and a ¼" (one-quarter inch) depth **111** are included with a single template **105**. Including a fixed bit stop may allow a user to set the router bit depth to a pre-selected depth such as a commonly utilized depth. For example, when cutting a sliding tapered dovetail joint most woodworkers select either a ½" (one-half inch) joint, a ⅜" (three-eighths inch) joint, or a ¼" (one-quarter inch) joint to connect the workpieces. The bit stops may allow the user to quickly reference these router bit depths, or the extent to which a router extends beyond the base, in an efficient manner. In the present embodiment, the fixed stop is formed as a bracket coupled to the main body of the template via a fastener, disposed generally in-line with a slot included in the template. In further embodiments, a stop may be formed as a bent lab or the like coupled to a template, a base, a separate mounting or the like.

Referring to FIGS. **28**A, **28**B, and **29**, in a further aspect of the invention a variable spacing router collar system **131** is described. Those of skill in the art will appreciate that while the collar system of the present aspect is described for utilization for fashioning a mortise and tenon joint, the principles of the present invention may be suitable for forming inlays, use with various joint guides, user constructed guides, lettering guides, and the like for allowing variable spacing between a guide and a router bit. The variable spacing collar system includes a collar body **115** configured for being received by a router base or sub-base **113**. For example, the collar body **115** is formed as a generally cylindrical sleeve having an outward extending flange **127** and a threaded end portion **129**. The threaded end portion **129** may be engaged by a lock ring **117**, having corresponding threading, for securing the collar system **131** to a router sub-base. In an advantageous example, the router sub-base/collar body are configured so the flange is substantially flush with or slightly recessed in the sub-base. A generally cylindrical outer sleeve **121** having a through aperture for being received about a portion of the collar body **115**

may be secured via a frictional engagement, a magnetic engagement, or the like. For example, an O-ring **125** having a sufficiently high coefficient for retaining the outer sleeve during routing may be disposed between the outer surface of the collar body and the outer sleeve. Preferably, the O-ring **125** is retained in a groove **133** formed in the interior aperture of the outer sleeve **121**. Retaining the O-ring in the outer sleeve **121** may prevent the O-ring from interfering with a collar body **115** tracing a template guide when the outer sleeve is disengaged. Additionally, a collar body groove **119** may be included to assist in aligning the outer sleeve **121** to the collar body **115**. Those of skill in the art will appreciate, a kit of outer sleeves having different diameters and/or a kit of collar bodies having different diameters may be included for permitting variable spacing. For example, a first outer sleeve **123** having a first diameter may be included as part of a kit with a second sleeve **121** having a second outer diameter greater that the first diameter. In a further instance, a series of collar bodies having differing outer diameters may be implemented for a substantially similar purpose. In an advantageous embodiment, a variable spacing collar system includes a kit of collar bodies/outer sleeves corresponding to commonly formed mortise and tenon joints such as ½" (one-half inch) joint, a ⅜" (three-eighths inch) joint, or a ¼" (one-quarter inch). Additional collar bodies/outer sleeves having slightly larger/or smaller outer diameters may be included for permitting fine adjustment to permit formation of a joint or inlay having a tighter or looser fit. In a further embodiment, a master guide holder may be mounted to the router, such as flush with or interior to the base/sub base of the router (so as to not interfere with router operation when a guide is not attached), with guides for mortise and tenon formation being coupled via a threaded engagement, via a frictional engagement, via a magnetic interaction, or the like for retaining the guide to the guide holder with threading on the master guide which may permit an enlarged opening for dust/debris. In this manner, the individual guides may be removed without removing the master guide holder.

In an exemplary method for forming a mortise and tenon joint, a template defining the desired dimensions is configured. A first workpiece which is to be configured with a tongue, or male member, is formed utilizing a router with an attached collar body for following the template. A second workpiece which is to be configured with the mortise or female joint member is formed with a router with an attached collar body having an outer sleeve attached. The first and second workpieces are subsequently interconnected.

Referring to FIG. **18**, a router support **135** for implementation with a jig apparatus is disclosed. In the current embodiment, the router support is formed with a fiat or planar rail portion **137** disposed substantially flush or equal to the surface of the template. Aligning the router support **135** substantially equal to the template may prevent tipping or tilting of the router bit during operation while providing a support surface for resting the router on during shaping operations. Tilting of the router/router bit as the router is manipulated by the guide may result in the joint being ill-fitting. The router support in the current embodiment is mounted to the mounting rail **141** included in the template mounting bracket **139**. In further embodiments, the router support may be mounted to the template, mounted to the base of a jig apparatus **100**, and the like. A support brace extending the length of the router support **135** may be included for reinforcing housing portion **145**. The housing portion **145** is formed with a curved or multisided portion directed generally toward the base. In this configuration, the housing portion **145** may direct dust and debris generated during material removal away from the template/router being manipulated adjacent the template when assembled to the jig apparatus **100**. Additionally, the router support **135** may be utilized in conjunction with a dust collection chute **147** to collect dust and debris.

Referring to FIGS. **18** and **19**, the dust collection chute **147** may be included as a removable accessory for the jig apparatus **100**. Preferably, the chute opening **153** extends substantially along the first side **106** of the base **143** to direct dust and debris into a remote vacuum system coupled by a hose. The dust collection chute **147** includes a mounting mechanism for coupling the chute to the jig base **143**. In the current embodiment, the dust collection chute includes a pair of spaced apart rods **151** (one is referenced) which are removably received in an aperture or recess included in the base. The rods may include threading for being secured via a nut disposed on an opposing side of the base **143**. In further embodiments, various mounting mechanisms may be implemented such as a received rail system, a fastener system (e.g., a screw or bolt received in a threaded aperture in the base), an interlocking lip and support (such that the chute may hang from a support for efficient removal), and the like. An outlet flange **149** may be included for attaching a suitable connection hose or duct for transferring the dust/debris to a central vacuum system or a dedicated vacuum. In additional embodiments, a securing mechanism such as a deformable tab system, a friction lock or the like may be included on or adjacent the outlet flange **149** for securing a vacuum transfer hose to the chute.

It is believed that the present invention and many of its attendant advantages will be understood by the forgoing description. It is also believed that it will be apparent that various changes may be made in the form, construction and arrangement of the components thereof without departing from the scope and spirit of the invention or without sacrificing all of its material advantages. The form herein before described being merely an explanatory embodiment thereof. It is the intention of the following claims to encompass and include such changes.

What is claimed is:

1. A jig apparatus for use with a router to aid in the removal of material for forming an interconnection between workpieces, the jig apparatus comprising:

a base comprising a front side extending generally vertically and a top side extending generally horizontally;

a template mounting system coupled to the base;

a template removably mounted to the template mounting system, the template comprising:

a plurality of guide fingers forming a top surface adapted to support a base of the router for movement relative to the template and a guide surface generally perpendicular to the top surface, the guide surface contacting a router guide to guide movement of the router relative to the template; and

a router support removably connected to the base and spaced apart from the template, the router support comprising a top surface adapted to at least partially support the base of the router for movement relative to the template, wherein the router support top surface is substantially coplanar with the template guide fingers top surface.

2. The jig apparatus of claim **1** wherein the router support is removably mounted to the template mounting system.

3. The jig apparatus of claim **2** wherein the template mounting system comprises a mounting rail, and wherein the router support is coupled to the mounting rail.

4. The jig apparatus of claim **3** wherein the router support is directly attached to the mounting rail.

5. The jig apparatus of claim 1 wherein the router support is removably mounted to the base.

6. The jig apparatus of claim 1 wherein the template comprises a template rail, and the plurality of guide fingers are supported by and adjustably secured to the template rail, each guide finger supported for longitudinal movement relative to the template rail, whereby the spacing between adjacent fingers is selectively variable.

7. The jig apparatus of claim 1 wherein the plurality of guide fingers are integrally formed.

8. The jig apparatus of claim 1 further comprising a dust collection chute removably mounted to the jig apparatus.

9. The jig apparatus of claim 8 wherein the dust collection chute comprises:

an intake opening extending at least partially along the front side of the base such that dust generated during material removal enters the chute through the intake opening, and

an exit port spaced from the intake opening such that dust generated during material removal exits the chute through the exit port.

10. The jig apparatus of claim 9 wherein the dust collection chute is removably mounted to the front side of the base.

11. The jig apparatus of claim 9 wherein the dust collection chute is removably mounted to the router support.

12. The jig apparatus of claim 9 wherein the router support further comprises a bottom surface that is positioned above the dust collection chute intake opening such that the bottom surface of the router support directs dust generated during material removal into the intake opening.

13. A jig apparatus for use with a router to aid in the removal of material for forming an interconnection between workpieces, the jig apparatus comprising:

a base comprising a front side extending generally vertically and a top side extending generally horizontally;

a template mounting system coupled to the base, the template mounting system comprising a mounting rail;

a template removably mounted to the template mounting system, the template comprising a top surface adapted to at least partially support the base of the router for movement relative to the template; and

a router support removably coupled to the template mounting system mounting rail and spaced apart from the template, the router support comprising

a top surface adapted to at least partially support the base of the router for movement relative to the template, wherein the router support top surface is substantially coplanar with the template top surface, and

an attachment mechanism releasably securing the router support to the template mounting system.

14. The jig apparatus of claim 13 wherein the router support attachment mechanism comprises a thumb screw.

15. The jig apparatus of claim 13 wherein the router support further comprises a bottom surface that is positioned such that the bottom surface of the router support directs downwardly dust generated during material removal.

16. The jig apparatus of claim 15 further comprising a dust collection chute removably mounted to the jig apparatus.

17. The jig apparatus of claim 16 wherein the dust collection chute comprises:

an intake opening extending at least partially along the front side of the base such that dust generated during material removal enters the chute through the intake opening, and

an exit port spaced from the intake opening such that dust generated during material removal exits the chute through the exit port.

18. The jig apparatus of claim 17 wherein the router support bottom surface is positioned above the dust collection chute intake opening such that the bottom surface of the router support directs dust generated during material removal into the intake opening.

19. The jig apparatus of claim 13 wherein the template comprises a plurality guide fingers, each guide finger having a top surface that that forms a portion of the template top surface.

20. The jig apparatus of claim 13 wherein the template further comprises a template rail; and the plurality of guide fingers are supported by and adjustably secured to the template rail, each guide finger supported for longitudinal movement relative to the mounting rail, whereby the spacing between adjacent fingers is selectively variable.

21. A jig apparatus for use with a router to aid in the removal of material for forming an interconnection between workpieces, the jig apparatus comprising:

a base comprising a front side extending generally vertically and a top side extending generally horizontally;

a template mounting system coupled to the base;

a template removably mounted to the template mounting system, the template comprising:

a plurality of guide fingers forming a top surface adapted to support a base of the router for movement relative to the template and a guide surface generally perpendicular to the top surface, the guide surface contacting a router guide to guide movement of the router relative to the template; and

a router support removably coupled to the template mounting system mounting rail and spaced apart from the template, the router support comprising

a top surface adapted to at least partially support the base of the router for movement relative to the template, wherein the router support top surface is substantially coplanar with the template top surface, and

an attachment mechanism releasably securing the router support to the template mounting system.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,717,145 B2
APPLICATION NO. : 12/268120
DATED : May 18, 2010
INVENTOR(S) : Steven D. McDaniel

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, line 53, replace "lest" with -- test --.

Column 1, line 67, replace "light" with -- tight --.

Column 2, line 19, replace "workplaces" with -- workpieces --.

Column 5, line 40, replace "loaning" with -- forming --.

Column 6, line 22, replace "culling" with -- cutting --.

Column 6, line 40, replace "lipped" with -- tipped --.

Column 7, line 54, replace "culling" with -- cutting --.

Column 7, line 56, replace "lightness" with -- tightness --.

Column 8, line 8, replace "lightened" with -- tightened --.

Column 9, line 14, replace "mourning" with -- mounting --.

Column 10, line 10, replace "mourning" with -- mounting --.

Column 10, line 56, replace "culling" with -- cutting --.

Column 15, line 16, replace "lest" with -- test --.

Column 15, line 64, replace "an" with -- art --.

Column 16, line 14, replace "culling" with -- cutting --.

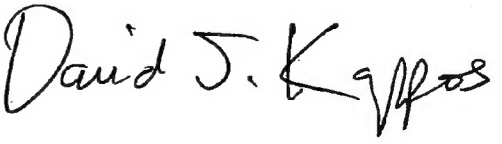
Column 16, line 46, replace "lab" with -- tab --.

Column 16, line 57, replace "line" with -- fine --.

Column 17, line 50, replace "fiat" with -- flat --.

Signed and Sealed this

Fifth Day of October, 2010



David J. Kappos
Director of the United States Patent and Trademark Office